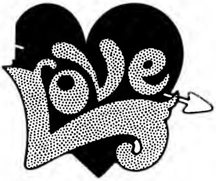
CW SAMPLE COPY
MI48103UIVYNUIVYN FC#B FC
UNIVERSITY MICROFILMS
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48103

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

ekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices ©1978 by CW Communications/Inc.

1 May 22, 1978 75¢ a copy, $18/year



Pertec Laboring for Lost Loves

By Ann Dooley
CW Staff

CHATSWORTH, Calif. — Romeo and Juliet might have lived to tell about it, Penelope might never have taken up knitting while awaiting Odysseus' return and Prince Charming wouldn't have had to play footsy with anyone but Cinderella if someone had only programmed a computer system to find lost lovers.

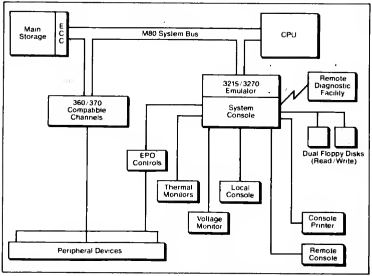
Pertec Computer Corp. (PCC) has done just that for present-day lovers who have lost touch and want to find each other again. The vendor is playing Cupid as a promotion for Columbia Pictures' new film, 'If Ever I See You Again," the story of a composer reunited with his former sweetheart after 12 years.

PCC went into the lost-love business to "help change the image of computers to a more humane and personal one," according to a spokeswoman. It's a positive and fun way to introduce computers to people who ordinarily don't have anything to do with them and have misconceptions about them, she said.

Nearly 18 other computer companies turned hard hearts on the project before PCC agreed to

(Continued on Page 6)

Double IBM Power Promised by Two CPUs Unveiled by Magnuson



The structural modularity of Magnuson Systems' M80 series of IBM-compatible mainframes results from a 32-bit bus that links the line's four principal hardware elements — the CPU, main memory, console and data channels.

By Jeffry Beeler
CW Staff

NEW YORK — Modular expandability and throughput as much as twice that of IBM's medium-scale systems reportedly highlight a family of 360-, 370- and Series 30-compatible central processors introduced last week by Magnuson Systems Corp.

The M80 series of general-purpose mainframes currently consists of two members — the Models 3 and 4, which are said to emulate the 370/138 and 370/148, respectively. Depending on the application, both models provide 20% to 100% greater processing power than their IBM counterparts, Magnuson officials said.

Later this year, Magnuson plans to extend the M80 series upward with the introduction of the Model 5, which will provide the same 1 2- to two-fold performance edge over its IBM equivalent — the 370/158.

When all the upward and downward extensions are added, a basic M80 processor will expand in power from a 370/115 to "well beyond" a 3031, according to company spokesmen.

Each member of the Magnuson series will also support all IBM operating systems as well as competing vendors software, they added.

Company officials attributed the M80's reputed performance edge over its IBM rivals to the series' 32-bit bus structure, which minimizes internal cabling and connects all four main systems elements — the CPU, memory, system console and data channels. This "strategic architecture" reportedly yields a structural modularity that allows users to expand the system by adding or replacing processor, memory or console boards.

A minimum M80 configuration, for example, incorporates logic for a CPU, 128K bytes of main memory and an IBM-compatible data channel on 27 modular printed circuit (PC) boards. Users, however, can upgrade this configuration to 4M bytes and nine data channels without increasing the number of boards merely by swapping some of the modules with more powerful replacements, Magnuson officials explained.

When additional PC cards are plugged into the system bus, an M80 series configuration can expand to accommodate as many as 16M bytes of main memory, eight system consoles and 16 data channels, they noted.

The bus architecture and structural modularity are also said to allow the system to accommodate future advances in hardware and software technology. For example, if IBM changed

(Continued on Page 6)

ICA Attendees Get Glimpse Of Business Satellite Use

By Ronald A. Frank
CW Staff

LAS VEGAS — Integrated business communications using satellite links came a step closer to everyday reality last week with the introduction here of the Office of the Future Controller by American Satellite Corp.

The device was among almost a dozen products introduced at the International Communications Association s (ICA) annual meeting.

The controller allows a company to utilize a full-duplex 56k bit/sec satellite channel for digital voice, data communications up to 9,600 bit/sec, facsimile, teleconferencing and other uses, according to a spokesman.

The unit includes a satellite delay compensation unit for data, an integrated voice data unit for digital voice and other control circuitry to handle a wideband satellite channel.

The Office of the Future Controller is believed to be one of the first to offer users an integrated facility via satellite

(Continued on Page 8)

White House Taps Interdata

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Interdata has found a first user for its "business computer system, a reconfigured version of its 7/32 minicomputer. And that user is none other than the White House.

Two weeks ago the firm installed the system in the Executive Office Building, where many of President Carter's staff and advisors are housed.

The mini and assorted accompanying I/O and communications gear will be used on an interim basis to develop information system applications, according to Carl Calo, assistant director of the Information Systems Division in the Executive Office of the President (EOP)

Calo and his staff have also drawn up and are circulating the preliminary specifications for the system they hope to have in place by the end of 1978 [CW, April 3] "If the federal govern-

(Continued on Page 6)

IN DEPTH

The data management software available today allows four different approaches to the data management problem, according to Ronald G. Ross. See Part I of "Data Base Systems: Design, Implementation and Management, beginning on Page 17.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM reg U.S. Pat. Off.

EDITORIAL

Editor	E. Drake Lundell Jr
Deputy Editor	Ronald A. Frank
Managing Editor	Nancy French
Associate Editor	Donald Leavitt
Assistant Editor	Frank Vaughan
Washington Bureau/ Chief	Edith Holmes
Staff Writers	Catherine Arnst Jeffry Beeler Marcia Blumenthal Howard Karten Timothy J. Scannell Brad Schultz Marguerite Zientara
Chief Copy Editor	Cheryl M. Gelb
Copy Editors	Barbara T. VanScoyoc Susan Gerrard Joe Hunn
Photography Editor	Ann Dooley
Editorial Assistant	Denise Petski
Editorial Cartoonist	Jim Orton
Contributors:	
Education	J. Daniel Cuuger
Legal	Roy N. Freed
Taylor Reports	Alan Taylor
Human Connection	Jack Stone

SALES

Vice-President	Roy Einreinhofer
Advertising Administrator	Terry Williams
Display Advertising	Mary Anne Furlong
Classified Advertising	Kathy Steinberg
Sales Promotion Director	Jack Edmonston
Market Research	Kathryn V. Dinneen

CIRCULATION

Vice-President	Margaret Phelan
Circulation Manager	Barbara Jeannetti
Customer Service Rep	Peggy Kelly
Assistant	Eleanor Smith

PRODUCTION

Manager	Lee Vidmer
Supervisor	Henry Fling
Assistant Manager	Peter Holm
Typesetting Supervisor	Donna Turnbull

Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone (617) 965-5800 Telex USA-92-2529

OTHER EDITORIAL OFFICES: Washington, D.C. : 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone (202) 347-0718. **England:** Roger Frampton, Computerworld Publishing Ltd., 2 Bath Road, London W41LN. Phone (01) 995-3352, Telex 934287. **W. Germany:** Hans-Jurgen Ballnath, Computerworld, c/o CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone (089) 34-90-01. Telex 5215350. **Asia:** Hidetsuna Sasaki, Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone (03) 445-0101. Telex J2424461.

Second-class postage paid at Boston, Mass., and additional mailing offices PN127420. Published weekly (except a single combined issue for the last week in December and the first week in January) by CW Communications/Inc.

Copyright 1978 by CW Communications/Inc. All rights reserved. Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Marion Kibbee.

75 cents a copy. U.S. — $18 a year. Canada and PUAS — $28 a year. Europe and Near East — $75 a year, all other foreign — $125 a year. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

CW COMMUNICATIONS/INC.

Board Chairman/ Publisher	Patrick J. McGovern
President	W. Walter Boyd
VP-Marketing	Roy Einreinhofer
VP-Finance	William P. Murphy
VP-Circulation	Margaret Phelan

ABP

mcc MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, MA. 02160. ac

British Paper Maintains Micros Portend Higher Unemployment, Less Women's Lib

By Nicholas Enticknap
Special to CW

LONDON — Technological advances — particularly the microprocessor — could increase unemployment, weaken the women's equality movement and further increase social upheaval, according to a report published here recently by Earth Resources Research Ltd.

"The Chips Are Down," a discussion paper written by Colin Hines, a researcher in environmental affairs who does not claim to be an expert in either computer science or economics, asserts that microprocessors will influence employment in three important ways.

First, they will prevent the government from ever solving the unemployment problem; second, by diminishing the number of secretarial jobs, they will have an important effect on the women's liberation movement; and, thirdly, they will make the work of middle management and of many professional people resemble that of an assembly line worker.

Hines argued these effects will exacerbate the strain of unemployment levels which is already being imposed by a number of other factors. Among these are the shift in emphasis from increasing output to increasing productivity in industry and the legacy of the high birth rate in the late 1950s and early 1960s.

The report warns that "the miseries of the upheaval of the 1930s will pale into comparative insignificance should Britain continue to drift on as at present and find itself in the situation where two, four, six or even seven million are out of work."

The mainly philosophical argument concentrates on the capabilities of computers rather than on examples of their effect on employment. However, Hines does quote the case of National Cash Register Corp. which reduced its manufacturing workforce here from 37,000 to 18,000 between 1970 and 1975 as a result of adopting microcircuitry in its cash registers.

Another example is the case of Western Electric, whose labor force dropped from 39,200 in 1970 to 19,000 in 1976 for similar reasons.

Hines concluded by saying "there will be no easy, wand-waving solutions," adding "priority must be given first to admitting the enormity of the problem and secondly to assembling the best brains in government, research establishments, industry, unions and the community to tackle this problem.

"Whatever happens, the effects of automation will be felt at every level of our society, and to prevent it from being torn apart will require the commitment of expertise and resources on a scale probably not seen since the war," he believes.

Earth Resource Research Ltd. is the policymaking arm of Friends of the Earth, well-known environmental organization. It published the report "in an attempt to stimulate discussion of an extremely important topic which, hitherto, has been the subject of very limited debate," the report said.

"The Chips Are Down" can be obtained from Earth Resources Research at 40 James St., London W1, England.

U.S. vs. IBM Antitrust Trial Plods by Third Anniversary

NEW YORK — U.S. vs. IBM, the longest antitrust trial in the history of this country, plodded past its third anniversary in court last Friday with little notice.

Opening statements were made on May 19, 1975. The government predicted its direct case would last six months, it finally rested its case on April 26, 1978.

IBM is now estimating its defense will last six months to a year. Believe it at your own risk.

There are some indications, however, that IBM's presentation will move at a faster pace than did the government's. The defense attorneys have developed a rapid-fire method of placing documents into evidence that enables them to offer 200 documents in a matter of minutes. This procedure formerly took days of court time.

IBM also agreed to drop 58 of the 70 user witnesses it had planned to call after the government agreed to stipulate that those eliminated would have testified in the same way as the first 12. This stipulation could signify a willingness by both sides to compromise — a willingness rarely shown during the last three years.

Nevertheless, IBM still has 96 witnesses left on its witness list, plus a reserve list of 47 people it may or may not call. Even if the trial's pace were stepped up to two witnesses a week, as some IBM attorneys have predicted it will, it is unlikely the defense will rest in a year.

Judging by current performance, it is even more unlikely there will be two witnesses a week. Richard Case, IBM's group director of Advanced Systems Development, has already been on the stand three weeks under direct examination.

On the Inside This Week

NEWS

Local Centers Eyed for Federal Services Delivery . . . 4
Execunet Decision Seen Undermining FCC 5
USDA Banking National Land Ownership Data 7
Poor Definitions Called Barrier to DDP Talks 9
Art Dealer Builds Data Base on Rare Paintings 10
Seminar Series on Professional Development 12
Growing Federal Users Group Sets Conference . . . 14
Firms Seen Hiring Philosophers, Therapists 15
Coast Guard Unit Tracking Marine Safety Data 16
In-Depth: Data Base Systems 17-23

EDITORIAL

Editorial: A Sad State of Confusion 24
Human Connection: Programmer Breakdown 25
Taylor Report: Open Letter to FCC Chairman 25
Book on DP Crime Sure to Be a Best-Seller 27

SOFTWARE & SERVICES

360/65, Packages Make Great Team 29
Users Rate CDC Tops in Network Service Study . . . 30
'Management IV' Backs Resource Reports 33
'Systemacs' Enforces Development Standards 34
International Securities Shown on Net 35
Picking RJE Vendor: Services Different 38

COMMUNICATIONS

Bank Credits Net With Improving Service 39
In-House Terminal Speeds Client Payments 40
NCR Has Another Checkout Unit 42
Motorola Boards Make Up CRT 44

SYSTEMS & PERIPHERALS

Univac Makes 90/80-4 Head of Family 47
On-Line Film Processing Seen in COM Future 48
Merits of CRT, Laser COM Devices Debated 51
Understanding of DP as Office Aid Lacking 52
COM Systems Described as Programming Tool . . . 53

MINIWORLD

System 34 Gains Magazine, Added Drives 55
Double-Sided Floppies Join Micropolis Line 56
Multiplexer Board Saves Three I/O Slots 63
TC-16 Gets Drives, Controller 64
Mini Boasts 20 Times Throughput of 1130 65

MICROCOMPUTING

Voice Data Input Unit Operates With Apple II 67
Dashboard System Shows Car and Road Data 70
Northwest Melds 8085A, Pascal 71

COMPUTER INDUSTRY

IBMers Reduce Size of Magnetic Bubbles 75
IBM's Next Move Seen Multimedia Networking 75
CDC Shareholders Put Curbs on Takeovers 77
$15 Billion Communications Mart Up for Grabs 78
Digital Communications Seen $35 Billion Mart 79
Revenues Rise 33% at DEC 81
Sperry Quarter Hits $1 Billion for First Time 82

Cinderella

Mirror, mirror on the wall, who makes the fairest DOS sort of all?

("SyncSort, friend, not IBM.")

Call (201) 568-9700.

Meet a real beauty.

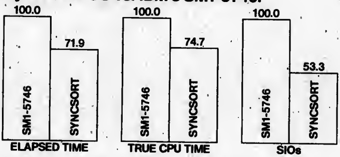
We're perfectly willing to admit that IBM makes a *lot more* DOS sorts than we do.

After all, the Rich Hardware Merchant has five of 'em sitting around the living room over there in Armonk, eating chocolates all day long.

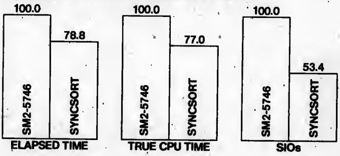
We, on the other hand, have a single DOS and DOS/VS sort that has to work very hard back there in the kitchen to earn its daily bread.

But if IBM has us outnumbered in *quantity*, there's just no comparison in *quality*. That's become increasingly apparent as more and more DOS processors have come around to see if their sorting slippers fit SyncSort.

We are, of course, somewhat nutty on the subject of benchmarks. And most of our users prefer to test SyncSort before they sign on the dotted line. Here are the results of 42 recent benchmarks, covering 213 files, that compare SyncSort's use of computer resources to that of IBM's two "top-of-the-line" sorts:



SyncSort DOS vs. IBM's SM1-5746.



SyncSort DOS vs. IBM's SM2-5746.

How did SyncSort do against IBM's other two "paid-for" sorts. Even better. And as for SyncSort's performance against old SM-483, IBM's "free sort," we can only remind you that the most expensive luxury in the world is a piece of free software!

Another interesting piece of information came out of these tests. We discovered that IBM's DOS sorts perform almost *exactly* the same as their OS sorts. Which is to say, somewhat lackadaisically.

And that may be the real moral of this piece. If you're about to propose to a new DOS sort, maybe you'd better meet the rest of the family first!

OVERSEAS REPRESENTATIVES —

Brussels: CAP/GEMINI Belgium
Dusseldorf: CAP/GEMINI GmbH
Geneva: CAP/GEMINI Switzerland
Hague: CAP-GEMINI/PANDATA
Johannesburg: Computing Benefits Ltd.
London: GEMINI Ltd.
Melbourne: Shell Oil Co. of Australia
Milan: SYNTTAX
Paris: CAP/SOGETI PRODUCTS
Stockholm: BRA
Tel Aviv: ADVANCED TECHNOLOGY, Ltd.
Vienna: CAP/GEMINI GmbH

WHITLOW COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Suggested by DP Revamp Team

Local Centers Eyed for Social Services Delivery

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Neighborhood centers that house or have access to automated systems capable of determining an individual's eligibility for a variety of human services are the key to improving the delivery record of federal welfare and benefit services, a Presidential study team said here last week.

The human resources team of the President's DP reorganization project recommended that President Carter establish a task force to smooth the way for states and local governments to implement systems that can decide welfare and benefit eligibility accurately at the time an individual applies for such services.

The team's recommendations were based on an examination of the Veterans Administration and three Cabinet-level departments: Labor; Health, Education and Welfare; and Housing and Urban Development.

States Ahead

Automated eligibility systems are already being used successfully in Wisconsin and South Dakota, the team noted. Federal leadership is needed to standardize the eligibility criteria for all human service delivery programs and to develop a uniform application form and prototype eligibility systems, it said in its draft report.

The President should also direct the Department of Labor to investigate the use of DP and communications technology to predict eligibility for black lung program benefits, the group said. Labor should take advantage of "existing, readily available, computerized technology" to clear up its backlog of several hundred thousand black lung benefit applications, each of which now takes an average of 296 days to process, the human resources team noted.

Like many of the programs examined by the team in its study, the black lung program has suffered from a failure on the part of the federal government to give sufficient consideration to the ways DP technology might be used to shorten the claims-processing cycle, the report stated.

Open to public comment on its work between now and June 2, the human resources team praised those innovative states and localities for their unaided efforts and sought, in its recommendations to the federal government, "to place [DP] in the context of the management of the human service delivery enterprise, rather than to consider it as a resource to be managed in isolation by technicians."

Executive Order Asked

The reorganization team's study of the federal human resource agencies — which will spend more than $260 billion during the next fiscal year to support and administer hundreds of programs that account for more than 50% of the federal budget and touch the lives of more than 100 million Americans — led to the further recommendations that an executive order be issued directing these agencies to define and focus on human service objectives.

These objectives include the timely, accurate and adequate processing of claims and applications; appropriate, adequate and consistent program coverage; and competent program administration, the report stated.

One-Step Centers

State agencies urged the team to adopt the concept of the one-step neighborhood center, where all program information and eligibility criteria would be concentrated and automated, to achieve these objectives. The government can assure smooth service delivery by continuously tracking how well these objectives are being met at the local program level, the team suggested.

The decentralization of services delivery "is capable of removing the security and privacy problems associated with the maintenance of large central files," the report said. "At the same time, a hierarchical structure of summary reporting measures can assure the continuing evaluation of the service delivery programs."

Uniform Definitions Needed

The federal government will find it easier to automate the delivery of human services if its first develops uniform definitions and performance standards for human services, the team stated.

Since 1974, an interagency team has been working on these definitions and standards, and the reorganization group recommended that a second Presidential task force carry that work still further.

The existing project, aimed at producing a common application for major, federally funded human service programs, is called the Single-Purpose Application With Automated Referral System (Spaars). Its definitions and classifications depend on an analysis of the statutes and regulations that govern seven major welfare and benefit programs, including Supplemental Security Income, food stamps and housing assistance.

The human resoures team would have the task force spend three months pursuing the Spaars effort — the only one of its kind in the federal government — and develop an interagency agreement on human service definitions. The work of this group would aid the attempts of the first Presidential task force, assigned for six months to enable states and local governments to implement automated eligibility systems.

End to Paternalism

The government should drop its "paternal" attitude toward the states and localities in the area of human services delivery, according to the reorganization team. The agencies in Washington can learn much from states like Wisconsin which, for the past two years, has used a single human service application form with computer-assisted prediction of an individual's eligibility for services.

In that state, caseworkers now can complete eight to 10 cases each day, rather than the two cases per day of two years ago. The Wisconsin project uses one application form for four human service programs — food stamps, Aid to Families with Dependent Children (AFDC), medical assistance and Supplemental Security Income — and a computer system, which predicts eligibility.

The increased caseworker productivity in Wisconsin has occurred despite the fact that the mainframe being used must be shared with 17 state departments and the state legislature. Moreover, the project has increased the accuracy of eligibility determination and made these determinations more consistent throughout the state, the human resources team reported.

Too Little Spending

Overall, the federal government invests too little in DP in comparison with the private sector to provide the proper support to service delivery programs, the reorganization team concluded. Low DP spending and a failure to relate the cost of DP and communications technology to the delivery of particular services are symptomatic of the federal "neglect" of automation as a resource, the group added.

To improve the transfer of technologies between agencies, resource sharing and information exchange, the human resources team recommended that Carter establish a Council on Information Quality and that senior DP people be appointed as advisors to Cabinet officers and agency heads. These "assistants to the secretaries for information" would provide advice on the management of information resources, consult on the availability of alternate technologies and maintain open communications between the agencies and other organizations.

Finally, the reorganization team urged the creation of an agency to provide all federal programs — including human services — with technical support. This agency would essentially be a pool of senior technical manpower, available to assist in the application of DP and communications to federal programs.

NEW NED CHAPIN WORKSHOP

STRUCTURED ANALYSIS

Summer workshops in the Rocky Mountains and San Francisco

Three days of fresh, useful tools for the Systems Analyst presented in a practical how-to form. Featured are an effective package of SA actigrams and datagrams (SADT), DF Diagrams and more structured alternatives, S-R user manuals, data dictionaries, and more, for a $495 fee. Try them out with the instructor's help and guidance in this Workshop.

Choice of Dates and Locations

☐ **Keystone Lodge, Colorado Rockies**
A modern conference center. Wide range of recreational opportunities.
July 31 through August 2.

☐ **San Francisco**
The city by the Golden Gate. Something for everyone.
September 5 through 7.

For course description and full information phone or write. Simply check off and return this ad with your name and address to:

Companion InfoSci Workshops

☐ **Reducing Software Complexity Workshop**
August 3-4 at Keystone, Colorado ($375)

☐ **Advanced Structured Techniques Workshop**
September 8-9 in San Francisco ($375)

☐ **Structured Design and Programing Workshop**
September 11-15 in Dallas ($625)

INFOSCI INC.
Box 7117
Menlo Park, CA 94025 (415) 854-1567

PRACTICAL TRAINING SINCE 1965

Call for Papers

33RD ANNUAL TECHNICAL CONFERENCE ON THE AMERICAN SOCIETY FOR QUALITY CONTROL, Houston, Texas, May 14-15, 1979

The theme of the conference is "Quality — Fundamental, Universal and Now." Papers are requested in the quality control field and related disciplines.

Persons wishing to submit a paper should first request a speaker's data sheet from the chairman of the technical conference program committee, John M. Wiesen, Org 1220, Sandia Laboratories, Albuquerque, N.M. 87185. The form should be returned, with an abstract, by July 15.

ASSOCIATION FOR THE DEVELOPMENT OF COMPUTER-BASED INSTRUCTIONAL SYSTEMS WINTER MEETING, San Diego, Calif., Feb. 26 to March 1.

To participate, send a two- to three-page abstract by June 1 to John J. Hirschbuhl, Ph.D., 206 Carroll Hall, The University of Akron, Akron, Ohio 44325.

Hinchman: Execunet Decision Undermines FCC

By Ronald A. Frank
CW Staff

LAS VEGAS — Recent decisions by a U.S. appeals court appear to have destroyed the careful introduction of telecommunications competition fostered by the Federal Communications Commission (FCC), according to Walter Hinchman, chief of the commission's Common Carrier Bureau.

Because of the court's decision ordering AT&T to provide local service to MCI Telecommunications, Inc.'s Execunet service [CW, May 15], a free-for-all entry policy has developed for the entire long distance communications business, Hinchman said.

Speaking at the opening session here last week of the annual conference of the International Communications Association (ICA), Hinchman said neither the FCC nor the court has developed sufficient data to show conclusively that competition in the Message Toll Service (MTS) and Wats areas will serve the public interest.

The court seems to have taken on the role of the commission in authorizing the Execunet service, he contended, adding there is a certain sense of madness in this confrontation between the commission and the court, in which the roles of each appear to have been reversed.

Because of the Execunet decision, the public is vulnerable to the potential deaveraging of MTS and Wats rates, which now defray part of the cost of local exchange facilities, he said. The telephone industry now has the right to file deaveraged rates at any time.

If the telephone carriers elect to file such deaveraged tariffs, it would be very difficult for the FCC to challenge such a rate structure simply because there is not enough cost-related information available, he pointed out.

In the long run, the real issue that must be faced is what should be done with the Bell System, Hinchman said. Many of the current policy and regulatory issues, such as Execunet, are a direct result of the sheer pervasiveness of the Bell System.

This applies not only to the telecommunications service industry, but also to the electronics manufacturing and financial segments, he added.

The FCC official said he is "virtually convinced" the Bell System is beyond the effective reach of both federal and state regulation and may therefore be impervious to most attempts at competition.

"I wonder how long we can ignore this basic structural issue while laboring mightily over all the peripheral issues that result primarily from it," Hinchman told the attendees.

CW Photo by R. Frank
Walter Hinchman

Commission Limited

Echoing Hinchman's views, Charles D. Ferris, FCC chairman, said the Execunet decisions have severely limited the commission's flexibility to deal with difficult issues of competition in an orderly manner and to determine where the public interest lies.

In the past, the FCC pro-competition rulings have deliberately avoided the MTS and Wats areas because no competition was contempleted for those segments, he said, noting the FCC's specialized carrier decision did not deal with this question. Now the commission has initiated a proceeding to examine the effect of these services.

One of the questions to be addressed is whether special tariff treatment should be given to favored customers at the expense of the general public, since there is no clear information on whether the big customer is subsidizing the small user or vice-versa. The effects of favored treatment such as bulk discounts must be shown to be in the public interest, Ferris said.

Prophet Spinoff Offered by BBN

CAMBRIDGE, Mass. — A version of Prophet, the graphics system used by a San Francisco pharmacologist to help develop cancer-killing drugs [CW, April 10], is now available as a standalone system for use on a Digital Equipment Corp. PDP-11 minicomputer..

Known as Mission, the system is said to provide many of the statistical and graphics data-handling facilities of Prophet and is available to anyone who wishes to license the product.

Prophet was developed by Bolt Beranek and Newman, Inc. here for the National Institutes of Health (HIH) and was only available to a few handpicked researchers funded by NIH on an already overloaded timesharing network, NIH said. Dr. Martin A. Apple, the San Francisco pharmacologist, did his work under such a grant.

The Mission system is available through BBN's Computer Systems Division. BBN is located at 50 Moulton st., Cambridge, Mass. 02138.

SOFTWARE SALES AND SUPPORT

IF YOU'RE THE BEST
WE WANT YOU

Altergo is one of the largest and most successful Software companies in the world, and our growth in North America has been dramatic. We are now looking for additional top sales and technical staff for our Regional Offices at:

NEW YORK, CHICAGO, MONTREAL,
ATLANTA, DALLAS, LOS ANGELES
AND SAN FRANCISCO

The current product range for IBM 360/370 users includes:

SHADOW II — the world's fastest selling independent TP Monitor.

QUOTA II — a powerful on-line programming and library maintenance system.

SPACE/MANAGER — the most advanced disk space management and reporting system available for DOS/VS users.

More exciting products coming soon

If you think you are capable of filling any of our vacancies, and you would like to obtain the top salaries and benefits in the industry, call or write Lindy Michele Parker at:

altergo

ALTERGO SOFTWARE INC.
40 William Street
Wellesley, Massachusetts 02181
Phone: (617) 237-6132

Magnuson CPUs Rival IBM

(Continued from Page 1)

its system software standards to permit memory expansion beyond the current 16M-byte limit; the existing M80 structure could adapt to accommodate a memory as large as 4G bytes, Magnuson claimed.

Moreover, the system could accept intelligent controllers and allow users to replace its current MOS memory with more advanced storage technologies like charge-coupled devices and bubble memory, the mainframer added.

Among its other purported advantages, Magnuson's strategic architecture reportedly permits the M80 to emulate mainframes from Burroughs Corp., Honeywell Information Systems, Inc., Univac and other non-IBM vendors.

'Voting' Boards

Finally, the system's bus design allows the use of "fail-soft" hardware, which in effect provides circuit backup and prevents CPU shutdowns during component failures, Magnuson spokesmen said.

One of these fail-soft hardware features is an optional "triplex voting" capability, which is said to allow processor boards to diagnose systems failures by comparing their processing results.

An M80 configuration can use up to four copies of each processor board simultaneously, the officials explained. If the system uses three boards, each "votes" on its processing results.

If the vote goes 3-0, all three continue running. If the boards vote 2-1, the system shuts down the offending module and allows the other two to remain operating.

If a subsequent vote by the remaining boards proves 1-1, the M80's console diagnostics reportedly allow the user to determine which of the two has failed. During system failure, the fourth PC card can serve as an operational spare to restore triplex voting, Magnuson said.

A memory error-correction capability built into the system's 1K random-access memory storage control module corrects single-bit errors, detects both double-bit and multiple-bit errors and displays error locations on the operator's console.

The system is also said to provide a minimum 8K bytes of firmware, which is required for the microcode translation features that ensure software transparency between the various M80 series models. Users can reportedly expand the system's firmware ot 256K bytes.

Able to work on 70% less power than its 370 counterparts, the M80 series cycles in 100 nsec and accesses memory in 250 nsec.

A typical Model 3 configuration with a CPU, console, 512K-byte main memory and three data channels costs $200,000. A similar Model 4 configuration with a 1M-byte memory and five data channels costs about $395,000.

Deliveries of both models will begin in June from Magnuson at 2500 Augustine Drive, Santa Clara, Calif. 95051.

The Amdahl Factor

SANTA CLARA, Calif. — Magnuson Systems Corp., which entered the mainframe market last week with the introduction of its M80 series, was founded in January 1977 mainly by ex-Amdahl Corp. personnel — and its roster even includes Carl Amdahl, son of Amdahl Corp. founder Dr. Gene Amdahl, as executive vice-president.

Other founding officers include Paul Magnuson, president, formerly with Amdahl Corp., and Raymond A. Williams Jr. another Amdahl graduate, now serving as vice-president for finance.

Robert McCullough, who serves as vice-president for operations and is also a founding member of Magnuson, was formerly with National Semiconductor Corp., where he worked on the IBM 370/168 add-on memory program.

Magnuson was originally financed by private investors, but received a major infusion of capital earlier this year, when Fairchild Camera & Instrument Co. entered into an agreement with the firm. Fairchild will purchase stock and convertible notes leading up to a one-third interest in Magnuson.

Pertec Finding Lost Loves

(Continued from Page 1)

the idea. Several were afraid of possible legal implications; others claimed they did not want to be held responsible for breaking up marriages.

The love matching began May 1. Since then nearly 5,000 calls have come into PCC facilities. The calls are expected to increase very soon, when the film is released, and continue at a high rate until the project ends July 1.

Three Matches

Out of thousands of calls that have come in, only three verifiable matches have been made, according to the spokeswoman.

Anyone wishing to find a former love can call PCC headquarters on a toll free line — (800) 423-5250 or, in California, (800) 382-3666 — and give his name and phone number, the name of the person to be located and the city where their romance bloomed.

An operator enters the information into a PCC XL40 data entry system via one of six 480-character CRTs. If the person being sought has already called PCC, a flashing heart with a moving arrow will appear on the screen to indicate a match. The system also displays the time of the matching call and the phone number where the second caller can be reached.

If a match is not made, the information is entered into the file inquiry system and stored in case the partner calls.

The system works only if both former lovers are looking for each other and each calls in requesting the other. A caller's privacy is protected since an individual can be reached only by the person he is trying to locate.

The data is coded so a match will be made only if each individual comes up with both the other person's name and the state they were living in when they knew each other. PCC officials further verify matches by calling back both parties.

The system is an XL40 distributed processing, state-of-the-heart microprocessor-based system with 128K memory, three 8.8M-byte disks and a 300 line/min printer. Its information retrieval package allows an operator to enter, validate, retrieve and update a file directly at the source.

White House Taps Interdata

(Continued from Page 1)

ment can have 'Sun Day' on a Wednesday, I can have Christmas in July," the White House DP head said of the formal request for proposal (RFP) he will issue early in July.

In the meantime, the Information Systems Division will develop and experiment with applications such as the First Lady's schedule and the White House photographer's rounds on the Interdata business system Model 700.

32-Bit Machine

The 32-bit machine will provide the EOP with 256K bytes of memory and was installed last week with two 80M-byte disks, two 1,600 bit/in. tape drives and a dynamic OS/32 operating system.

The business system will also support an initial 16 terminals and eventually will accommodate 32 CRTs and keyboards under the Interdata Telecommunications Access Method (Itam), according to an Interdata spokesman. No terminals have been delivered yet, however.

The firm also included Cobol and Interdata's soft-merge package in the system.

While Interdata's standard delivery time is 30 days, the spokesman indicated the system was in place in the Executive Office Building 10 days after the contracts were signed because "the White House asked us to move as quickly as we could."

Calo commented at a recent private meeting here that the addition of the Model 700 represents little or no increase in the Information System Division's expenditures. He also stressed that the machine will be replaced by the final White House information system procurement.

The final system procurement will involve a variety of terminals and other I/O devices designed to serve individual user needs and at least one secure mini that can be used to process classified and sensitive information in a stand-alone capacity and to communicate with other EOP network components.

The procurement will also include a communications processor or processors that will let users communicate with public and private external systems as well as with each other and main CPUs that will provide capacity and backup for critical processing and large internal systems such as the Office of Management and Budget's budget management system, sources close to the White House said.

TI BUBBLE MEMORY TERMINALS
Now available for delivery

Model	Purchase Price	24 Mo. Lease To Ownership Plan	12 Mo. Rental
TI 765 Bubble Memory	$2,795	$140	$125
TI 745 Portable	$1,745	$ 95	$ 85

Rental and lease plans tailored to your requirements.
Quantity discounts available.

Capital Systems, Inc.,
4601 North Park Avenue
Chevy Chase, MD 20015

(301) 652-

Building Data Base on 370/168

USDA Banking National Land Ownership Data

By Ann Dooley
CW Staff

WASHINGTON, D.C. — A nationwide land ownership survey being conducted by the U.S. Department of Agriculture (USDA) here will provide information never before gathered on who owns land in this country and to what use it's being put, a USDA spokesman said.

Data on income bracket, nationality, age, race, sex and place of residence from randomly selected land owners will be compiled and processed by the USDA's IBM 370/168. The resulting information base will enable land planners to determine current and future trends, according to USDA senior economist Gene Wunderlich.

The survey will be based on information provided by owners of 60,000 "points" of land in the continental U.S. The "points" are sites selected by the Soil Conservation Service for which the owner, soil type and land use are already documented.

How Many Very Large Owners

Once the 370/168 has processed the information, "we should be able to say how much land is owned by very large owners of over one million acres and how much is owned in tracts of less than one acre," according to USDA economist Robert Otte.

It also will be possible to determine how much land is owned by individuals, how much by corporations and what type of owners own what type of land, Otte said.

In addition, it will now be possible to test hypotheses such as whether age or income makes a difference in land conservation, for example, Wunderlich noted.

The U.S. survey was developed in part from a prototype study done in Rappahannock County, Va. That study revealed striking information about absentee land ownership, estate size and wealth and land distribution.

Questionnaires Mailed

In the national survey, questionnaires were recently mailed out to land owners across the country and they are now starting to come back in, according to the economist. Once all the questionnaires are completed and returned, the data will be coded onto punch cards and then transferred to magnetic tapes at the USDA computer center, he said. The compiled statistics will be printed in summary tables according to the department's requested specifications and will probably be finished some time this fall, Wunderlich predicted. The system runs on VS/2 and is generated in Fortran.

It is intended to be a one-time survey, although the USDA would like to repeat it in another five years in order to keep a current base of data, he noted.

The survey will gather only land-ownership-related information, Wunderlich said, and no personal information such as Social Security numbers will be used.

The survey information will also be used for analytical purposes in determining owner characteristics and type of land use. The data may also provide clearer perspectives for enacting land policies, such as determining whether the right people will actually benefit from proposed land reform measures, he said.

In addition, knowledge of the structure of land ownership in particular communities provided by the computer base of information will enable decision makers to learn how a subsidy will affect a community, he said.

Impetus for Survey

The survey was conducted for a variety of reasons, among them the need to know more about the steady decline of crop land and also about the potential impact of foreign investment in this country, he said.

Statistics compiled from the experimental Rappahannock County study showed that 53% of the landowners lived elsewhere. Further, 9% of the owners earned $50,000 or more per year and owned 41% of the land, while 31% of the owners had incomes of less than $10,000 and owned only 13% of the land.

The study also showed that 47% of the owners had 58% of the land, 43% considered themselves professional, technical or managerial, 25% were retired and only 5% were farmers.

The DP system for the county was designed as "an inexpensive land information system for small rural counties which could not afford a more sophisticated recordkeeping system," according to Wunderlich. Since the program was experimental, all the DP work was performed on the USDA's central 370/168 but with the capability of being converted to a small business system.

The county system used a special computerized code for each parcel of land and linked taxes, transfer and land use records to provide tax billing, assessment and planning systems. The county had its own local identifier that replaced all national codes for the county-level recordkeeping, he said.

Such a system could also theoretically be used in a county-to-county link providing each participant with up-to-date information on changes in land use and ownership.

CICS Users:

You've just written your last on-line data entry program.

KEY/MASTER is the CICS application development system you've been waiting for. With KEY/MASTER data entry applications are designed and tested right at the terminal. There's no coding, no compiling, and no delay.

Easy to use.

All you specify is the format of the data to be entered and the editing rules. KEY/MASTER does the rest. All the logic needed to accept data, edit it, and store it in KEY/MASTER's own on-line database is built in.

If you've wanted to bring your key-entry facilities on-line, now is the time. KEY/MASTER's features are superior to all known key-entry systems (whether keypunch, key-to-tape, or key-to-disk) and require no user programming.

Ready in minutes.

KEY/MASTER can be installed and ready for use in minutes. It works with both CICS and CICS/VS and runs under any operating system. All you need is 32K of virtual or real storage and one or more local or remote 3270 (or compatible) terminals.

No risk!

KEY/MASTER can be leased for $295 per month or purchased for $12,000. Each system comes with a 30-day no-risk guarantee. After 30 days, if you're not convinced that KEY/MASTER is the ideal system for developing on-line data entry applications, simply return the system for a full refund.

We'll be glad to tell you more, give you a demo, or sign you up for a 30-day trial. Just clip the coupon or call.

tsi®

turnkey systems inc.
111 east avenue
norwalk, connecticut 06851
(203) 853-2884/telex 964351

839 mitten road
burlingame, california 94010
(415) 697-1833

tsi international, ltd.
19 bedford row
london WC1R 4EB, england
01-405-7304/telex 23302

additional
representation
worldwide

ADAPSO SOFTWARE INDUSTRY ASSOCIATION

☐ We're interested. Send a brochure.
☐ We'd like a demo.
☐ Schedule us for a 30-day trial.

Name ________________
Title ________________
Company ________________
Address ________________
City ________ State ____ Zip ______
Phone ________________

ICA Glimpses Use of Satellites for Business

(Continued from Page 1)

to serve varied telecommunications needs.

To demonstrate the capabilities of the Office of the Future Controller, American Satellite erected an all-digital, 16-foot earth station that enabled users at the ICA conference to listen to digital voice communications and to transmit data communications over the 56k bit/sec link. Facsimile and video conferencing techniques were also demonstrated.

The satellite carrier announced the first users of the integrated office approach to telecommunications would be Univac, Boeing Computer Services and Western Bancorp DP Co. Univac is expected to begin using the satellite facility sometime in June.

A typical system includes the controller system, two 16-foot transmit/-receive earth stations and a 56k bit/sec channel. The system costs about $12,000/mo depending on options.

Delivery takes about eight months to allow for site preparation and installation of the earth stations and other required equipment. American Satellite Corp. is at 20301 Century Blvd., Germantown, Md. 20767.

Teletype Corp. went to the ICA meeting to introduce a teleprinter, the Model 42, aimed at five-level code applications. The company also added a buffered memory capability to its Model 43.

The Model 42 is available in buffered receive-only, buffered send/receive and buffered automatic send/receive versions. Designed as a replacement for Teletype's earlier Model 32, it was developed for Telex operations with operator-selectable speeds at 45.5-, 50-, 75-, 100- and 225 bit/sec, the firm said.

Buffered versions of the Model 42 contain up to 20K characters of solid-state memory. The buffered terminal can send and receive data on-line via the buffer while messages are simultaneously prepared for future transmission..

Transmitted text is stored in the memory; if a message is not received correctly, it can be retrieved, edited and re-sent, a spokesman said.

Friction-feed and pin-feed printer options are available with the Model 42 series.

The Model 42 is compatible with the CCITT standard No. 2 for international Telex use, the company said.

The basic five-level Model 42 is priced at about $3,100 with a paper tape capability adding about $1,300 and buffering priced at about $1,000.

Added to the Model 43 series was a buffered version with a microprocessor-controlled memory that provides up to 20,000 characters of storage. The Model 43 transmits at 1,200 bit/sec; tapeless text editing allows an operator to locate text by string searching.

Text can be corrected or changed by character deletion and insertion prior to or after transmission, the spokesman noted.

The printer operates at 30 char./sec and can produce an original and up to two copies, the company said.

The basic buffered terminal costs about $2,900. The addition of paper tape and buffering costs the same as on the Model 42.

Deliveries of the units will begin early in 1979, although some models of the 43 are available this year. The purchase-only terminals will be supported by Teletype; service centers have been set up in 43 cities. Teletype is at 5555 Touhy Ave., Skokie, Ill. 60076.

Video 200 Terminal

Western Union Data Services introduced a microprocessor-based intelligent CRT that operates with the earlier Smarts controller to provide a terminal system that can handle multiple applications.

Called the Video 200, the terminal can support full- and half-duplex transmissions, Teletype mode, TWX messages and binary synchronous protocol. It is compatible with Bell 103- and 202-type data sets.

The unit includes a 12-in. screen with a 128-char. upper/lower case Ascii display set. Eight preprogrammed function keys can move data from the Smart controller's floppy disk storage to the screen.

A typical configuration of the Video 200, EDT 33 teleprinter and Smarts controller programmed for 1,200 bit/-sec operation leases for $360/mo on a three-year lease including maintenance. Deliveries are scheduled for the fourth quarter.

Western Union Data Services is at 70 McKee Drive, Mahwah, N.J. 07430.

Racal-Milgo Additions

Racal-Milgo Corp. introduced three modem series operating at 4,800-, 7,200- and 9,600 bit/sec. The microprocessor-controlled data sets called the MPS family, include single-port or multiport configurations for point-to-point, multipoint and polling applications.

The modems feature a high-speed training capability called Fastran, which is said to achieve a 30 msec RTS/CTS response time.

The MPS 9601 series operates all three speeds and is on-line-compatible with the firm's 96 Multi-Mode series. The single-port version costs $8,250 or $179/mo on a 30-month lease.

The MPS 7201 runs at 7,200- or 4,800 bit/sec. A single-port version costs $6,675 or $160/mo on a 30-month lease.

The MPS 4801 runs at 4,800 bit/sec and costs $4,850 or $120/mo on a 30-month contract. Racal-Milgo is at 8600 N.W. 41st St., Miami, Fla. 33166.

Infocom Buffer

TRT Telecommunications Corp. displayed an intelligent communications buffer that allows Western Union Infocom users to link directly into international overseas private-line circuits.

Called Infolink, the buffered service provides automatic code and speed conversion from 10- or 30 char./sec Ascii to 50- or 75 bit/sec Baudot code for compatibility with international links. Infolink costs $229/mo from TRT Telecommunications, 1747 Pennsylvania Ave. N.W., Washington, D.C. 20006.

Gandalf Modem

Gandalf Data, Inc. showed its LDS 140 asynchronous local data set that reportedly can transmit data up to 12 miles on loaded wire pairs at speeds up to 4,800 bit/sec. At 9,600 bit/sec, the unit can transmit up to six miles over unloaded wire, the firm said.

The four-wire, full-duplex unit is priced at $450 from Gandalf, 1019 Noel Ave., Wheeling, Ill. 60090.

Run ISAM Files on 3330-II and 3350's with DOS/VS Rel. 34

With The Value Computing Advanced Function ISAM 3330-II/3350 Native Mode Support

- ☑ No reassembly of Your Programs
- ☑ No Changes to Your JCL
- ☑ Completely Transparent to Operations

Value Computing Inc.
The Computer Operations Company

Please send me more information about ISAM Native Mode Support

NAME ____________ COMPANY ____________
TITLE ____________ PHONE ____________
ADDRESS ____________ CITY ____________ STATE ____________
ZIP ________ CPU ____________ OPERATING SYSTEM ____________

Mail to: VALUE COMPUTING INC.
300 VCI Building, W. Marlton Pike
Cherry Hill, New Jersey 08002

Or call toll-free **800-257-8242**

1078

WE WILL LEASE
3032's AND 3033's
Four Year Term
Attractive Rates
Upgrade Provisions

CALL RAY HOMA

COMPUTER EXCHANGE/
NORTH AMERICA CORPORATION
302 Technology Park, Suite 101
Norcross, Georgia 30092
(404) 449-4400 or (800) 241-4311

Terms Imprecise: Fiedelman

Poor Definitions Called Barrier to DDP Talks

By Howard A. Karten
CW Staff

NEW YORK — One of the difficulties users encounter in discussions about distributed data processing (DDP) is the imprecise terms and equipment definitions used in this rapidly emerging field, according to Lawrence Fiedelman, president of Management Information Corp. and publisher of the "Datacomm & Distributed Processing Report."

Speaking before a workshop on equipment selection at the Mid-Atlantic Computer Expo '78 here recently, Fiedelman pointed out that "today's DDP product was a key-to-disk product six months ago and a data entry product two years ago."

According to Fiedelman, "DDP is the division of logically related DP functions among multiple, geographically dispersed computer systems." Further, "yes" answers to the following questions would indicate a company really has adopted DDP:

- Are the DP activities themselves decentralized?
- Does the company have multiple systems?
- Is there some form of data communications?

Fiedelman, who is also a consultant, offered several equipment "look-for" criteria to the seminar group. These include the ability to support multiple terminals and multiprogramming, the ability to handle file management and the presence of business-oriented software.

Additional criteria include the existence of data communications software, a user-oriented langauge, data entry software and transaction-oriented processing.

The file management capability of a minicomputer under consideration, according to Fiedelman, should include the ability to access data from the system's own files or from a central data base, while the need for a data entry capability means a user will have to invest a considerable amount of money to provide such a feature if it is not already present.

Discussing the data communications features of a system under consideration, Fiedelman mentioned five items to consider. These are the ability to do remote batch work or otherwise emulate an IBM 2780 or 3780 terminal, the ability to perform interactively like an IBM 3270 CRT, the presence of Synchronous Data Link Control protocol, a concurrency ability and a networking capability.

Major concerns of a user in undertaking equipment selection should include security, data integrity, backup by the vendor and service and support. Additionally, questions of program development, systems usage and system control must be addressed, he noted.

Discussing the security aspect, Fiedelman commented that DDP "can open up a system to unauthorized entry better than anything I know." The program development question, he added, is particularly relevant since hardware support from a vendor may be close at hand, while the author of a particular piece of software "may be across the country."

More Seeing DP As Privacy Peril

NEW YORK — An increasingly large number of Americans fear they are relinquishing their privacy when they apply for credit cards and buy goods on an installment plan, according to Humphrey Taylor, deputy chairman of Louis Harris & Associates.

Speaking on "Individual Rights in the Corporation" or a seminar here sponsored by the New York University Law School and the "Civil Liberties Review," Taylor said about 54% of the public thinks computer data banks pose a threat to personal privacy, compared with 38% four years ago. The statistics came from a series of Louis Harris Polls, he said.

The statement that "when Americans open their first charge account, take out a loan, buy something on the installment plan or apply for credit they begin surrendering their privacy" met with agreement by 71% of the public, up from 48% four years ago, Taylor said.

Report Debuts On DP Misuse

RYE, N.Y. — A report entitled "Detecting and Preventing Misuse of Data Processing Systems" has been issued for the first time for DP management, systems designers and DP auditors who are concerned with the problems of computer fraud and violations of information privacy.

The report defines 15 major exposures that can result from unauthorized acts by both internal personnel and outsiders. It also describes 83 procedures or safeguards that can help detect and/or prevent misuse of computer systems.

The report is available from Reymont Associates, 29 Reymont Ave., Rye, N.Y. 10580 for $5 per copy postpaid.

BURROUGHS USERS—A LINE PRINTER FOR YOU.

At 30 to 50% off Burrough's price for the same printer.

If you have a 300-1800 LPM printer requirement, contact BDS. Don't buy your printer from Burroughs. Do buy the same Dataproducts printer that Burroughs offers, but buy it from BDS and save 30 to 50%.

BDS printers are in complete conformity to Burroughs specifications. We supply the interface required to make the printer 100% compatible with your CPU buffered controller. If you don't have a buffered controller, BDS will supply either the PCC version, or the new DLP (Data Link Processor) version for your X800 System.

BDS delivers fast for we are stocking distributors. And we offer national service.

Featured in the Dataproducts list of line printers:

☐ The 2200 Series-gives significantly low operation cost at 300, 600, and 900 LPM.
☐ The 2550 Charaband-sets a new standard in horizontal font printers at 1200-1500 LPM. An added bonus— two character sets standard.
☐ The 2470 Heavy Duty Drum-offers real price performance advantage at 1500-1800 LPM.

The business of BDS is selling Dataproducts printers to the end-user and System House marketplace. We have sold hundreds of these printers to Burroughs, DEC, HP, and practically all mini-users. So, if you are interested in saving 30 to 50% of printer costs, call us or mail the coupon.

PRICE PERFORMANCE

Speed (LPM)	Dataproducts Model No	BDS Prices Printer	BDS Prices Controller and Cable*
300	2230	$14,000	$2 500
600	2260	18 000	2 500
900	2290	25 000	3 000
1200-1500	2550	32 000	3,500
1500-1800	2470	32 000	3 500

*Required only if your present CPU needs printer buffered controller

Users:
B 800/80
B 1700/1800
B 3500
B 4700/4800
B 6700
B 7700
TD 700/800 Terminal Series

Yes, I want to save 30 to 50% of printer costs.

The computer system I use ______
My line printer requirements are ______
Name ______
Title ______
Company ______
Street ______
City ______ Zip ______
State ______
Telephone ______

BDS Computer Corporation, 1149 Chestnut St.
Menlo Park, CA 94025, (415) 326-2115

BDS **BDS Computer Corporation, 1149 Chestnut Street**
Menlo Park, CA 94025, (415) 326-2115

Lists Ownership Histories

Art Dealer Builds Data Base on Rare Paintings

By Brad Schultz
CW Staff

NEWBURYPORT, Mass. — An art dealer here can generate the ownership history, including the current location, of rare and valuable paintings with its minicomputer-based data retrieval system. The dealer may soon offer this capability to galleries, museums and other institutions.

Steven Straw Co. is using computer technology to establish itself as an archivist of art information. Straw is now transferring its inventory data base to an IBM System/34 CPU, according to its vice-president, Peter F. Fagley.

Each record in the data base stores an artwork's "provenance" — the history of who has owned the work, where it is currently located and when and where it has been exhibited.

Each record also includes the artist's name, the painting's title, its physical dimensions, its medium, whether the work is signed and the date it was completed.

There are no other galleries using computers in the same fashion, Fagley noted. The National Collection of Fine Arts — a museum of the Smithsonian Institute — has the only other computer system of this type, which is called Selgem. Selgem is used to keep track of American paintings executed before 1914.

Straw normally sells paintings by approaching museums and private collectors in the U.S. and Western Europe. The firm basically tries to match each painting it has for sale with the indicated desires of a client and must therefore stay apprised of a painting's market demand, recording the information in a manner that facilitates comparison with its inventory data base. Typically clients register their wants by responding to questionnaires the dealer regularly mails out or via telephone inquiries.

Straw acquires its inventory information from other galleries, private collectors and art buffs, museums and similar institutions. Often the information is volunteered without solicitation, Fagley said, indicating a number of organizations and individuals simply wish to help his firm build one of the nation's most comprehensive archives of paintings.

Each Straw client receives a regularly mailed summary of the dealer's offerings and may thus contact the dealer when an item of interest becomes available, Fagley said. When Straw matches a client with a painting, the dealer will generally deliver a documentation package on the painting to that client.

End to File Draws

Before automating, Straw stored its inventory and customer data in file drawers. Mere scraps of information — for example, that a certain painting had been exhibited in the Metropolitan Museum 40 years ago — could only be incorporated in the files by a "laborious" hand procedure, Fagley said.

Straw personnel must cross-reference information on many records to compile such data as the titles of all works in stock by a given artist or a list of all watercolors available in a given retail price range. To keep cross-indexes accurate, a number of records must be modified every time a given record is updated.

Compelled to automate in order to meet its need for high-speed editing of many records in a data base, the firm initiated its retrieval system on a Digital Equipment Corp. Datasystem 310 list processor about two years ago. The machine failed to meet Straw's needs, however.

Straw purchased the DEC processor from a third-party dealer "who didn't understand our requirements and led us to believe the machine could do a lot more," Fagley said.

"The programming was very, very simple. We just bought a standard package for list processing, and that was it. There was very little tailored design to our specifications," he continued, noting the chief complaints with the 310 were its slowness and inability to edit information.

Moving to Third System

Last September, Straw ordered the System/34 to drive its system and, at the same time, replaced the 310 with a leased IBM System/82 for use until the 34 arrived. McCracken Computer, Inc. of Lexington, Mass., installed the 32 and has implemented inventory, client maintenance, historical archives, accounting and general ledger programs for Straw in RPG-II.

McCracken consultant Walter Cole described the System/34 configuration now being installed as including a 53/40 processor with 64K bytes of memory, a 27.1M-byte disk storage device, a double-density diskette reader, a matrix printer, a 160 line/min printer and four CRT workstations.

Remote terminal access to the data base may become a service of Straw soon after the current CPU conversion ends, Fagley indicated.

SALE OR LEASE
370/138
AVAIL: 6/1/78
$6400. P/Mo.

Contact Bernie Gest
215-635 1700
Computer Marketing Inc.
7704 Seminole Ave
Melrose Park, Pa
19126

Member Computer Dealers Assoc

COMPUTER INTERFACE TECHNOLOGY
BUY-SELL-TRADE □ WE'RE THE BEST IN THE WEST
FOR DEC, DG, INTERDATA EQUIPMENT
SAVE 10% to 50% ON YOUR MINI NEEDS
THIS MONTH'S SPECIALS
PDP-11 32KB Memory, New $975
Shugart SA800/1 Drive, New $450
CDL-11 A,B,C,D,E, Async Interface, New .. $420
2080 South Grand, Santa Ana, CA 92705
Hot Line (714) 979-9920
BROKER-DISTRIBUTOR-MANUFACTURER

MICRO WORLD™
TI 745
$1795*
Put the speed and efficiency of your computer as close as the nearest phone.
- Limited quantity in stock for immediate delivery
- 90-day warranty direct from TI
- Fully portable with built-in acoustic coupler

* plus shp. & hdlg.

MICRO WORLD™
1425 W. 12th Pl.
Tempe, AZ. 85281
602-894-1193

LOCATE
EVALUATE MINICOMPUTER SOFTWARE
–NOW TWO VOLUMES–
MINICOMPUTER SOFTWARE QUARTERLY
WITH
•Over 500 detailed program descriptions
•Indexed by: Application —
Hardware — Language
Subscription Includes:
Base Volume Set + 4 up-dates
$55. US/Can (+5% Tax in Mass.)
$110. Foreign (prepaid only)
INTERNATIONAL MANAGEMENT SERVICES, INC.
215 Oak Street, Dept. C, Natick, Mass. 01760

Output today....
Outgrown
tomorrow!

The technology of computer output equipment is changing — and fast. Where there were once only punched cards and paper, there are now a wide range of devices designed to expedite the output process. *Computerworld* will be taking a close look at these and other related topics in our June 26th Supplement entitled: *Computer Output Equipment*.

Edited by Tim Scannell, *Computer Output Equipment* will be focusing on ways to cut output costs, with tutorial and applications stories on the latest equipment and systems, including:

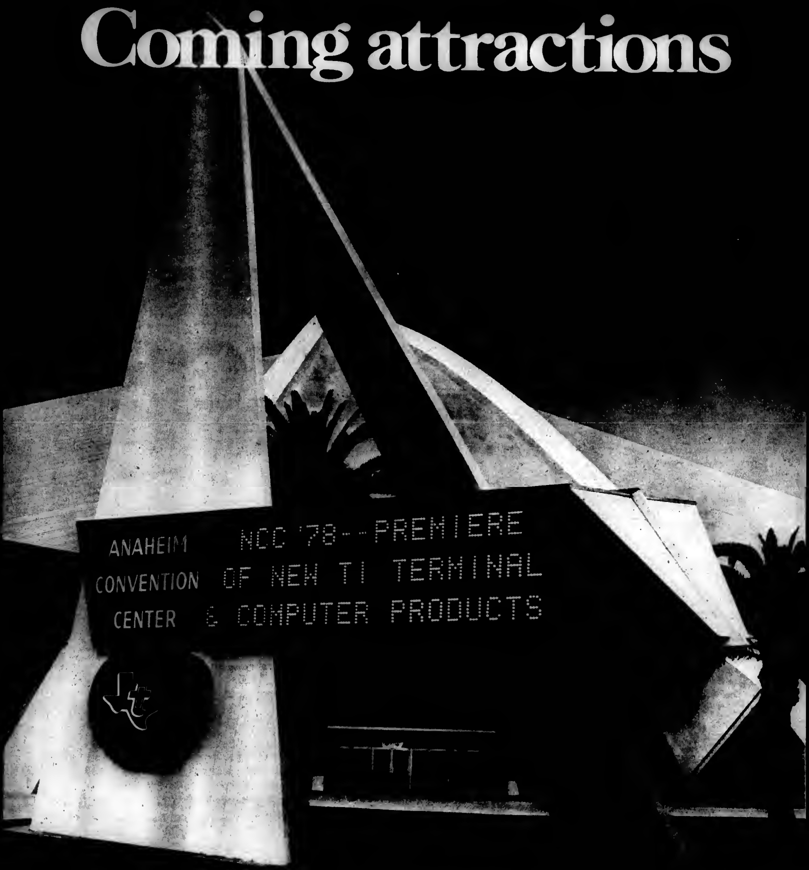
- Off line printers
- Interactive printer terminals
- Microfilm
- Microfiche
- High speed non-impact printers

If you want to stay up to date on the state of output, don't miss this June 26th Special Report.

If you're marketing computer output equipment or services — call your *Computerworld* sales representative. He can give you all the details and special assistance in ad planning. Or, to reserve space, call Terry Williams at (617) 965-5800. Closing date is June 9th.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Boston	New York	San Francisco	Los Angeles
Bob Ziegel	Don Fagan	Bill Healey	Judy Milford
Ron Evans	Frank Gallo	Jim Richardson	Bill Healey
Frank Collins	Peter Senft		Jim Richardson
(617) 965-5800	(201) 461-2575	(415) 421-7330	(213) 475-8486


Coming attractions
ANAHEIM CONVENTION CENTER
NCC '78--PREMIERE OF NEW TI TERMINAL & COMPUTER PRODUCTS

Copyright © 1978, Texas Instruments Incorporated

TEXAS INSTRUMENTS.

Seminar Series on Professional Development

ANAHEIM, Calif. — In addition to the more than 100 conference sessions planned for the National Computer Conference here June 4-8, "Professional Development Series" made up of 15 tutorial seminars will be presented.

The series will run concurrently with NCC, which is sponsored by the American Federation of Information Processing Societies (Afips).

Each of the seminars in the series — which will be run under the direction of Gopal K. Kapur, consultant with Kapur and Associates — will be limited to 100 registrants and will cost $45, which includes complete course material plus admission to the NCC exhibit program and the Personal Computing Festival.

The seminars are:

- **An Overview of Word Processing** will describe the discipline of word processing and include information on equipment, planning, implementation and changes in organizational structure.

The course, presented by Amy D. Wolh of Datapro Research Corp. will also include coverage of anticipated trends in office automation as they relate to word processing.

- **Women and Management Update — Skills for Winning.** This course will provide the information, skills and techniques important to working women who are engaged in, or about to assume, management responsibilities.

Topics will cover "tokenism," strategies for getting a fast start on a new job, deciding when one has been in a job too long, selecting the right boss, getting the most from meetings and overcoming barriers in being first woman on the job. It will be presented by Dr. Dru Scott of Dru Scott Associates, Inc.

- **How to Get Started With Microcomputers** will cover the decisions involved in development, production and marketing of products using microcomputer technology. The seminar is designed for decision makers with responsibility for planning, marketing and production management.

This seminar will be presented by Eric R. Garen of Integrated Computer Systems, Inc.

- **Developing Managerial Skills** will analyze the job requirements of the DP manager with emphasis on required skills and training. The course will examine the managerial function and the concepts of interpersonal communication and will be presented by Donn L. O'Neil of the National Learning Institute, Inc.

- **Information System Architecture — A Management Perspective.** A philosophy for information system analysis and design, based on a functional analysis of organizational data resource, will be examined.

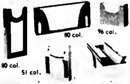
Included will be establishment of the need for a more formalized approach to the building of information systems, creation of a conceptual framework for the information system design task and suggestions for a structure for information system architecture projects.

Recent experiences with this methodology will also be evaluated. This seminar will be presented by Cory K. Foster and Ocie M. Gamble of Cincom Systems, Inc.

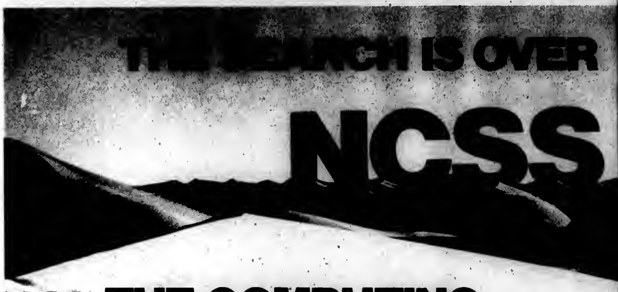
- **Requirements Analysis and Definition** will analyze requirements analysis and definition and how they relate to other aspects of software development. The nature of this task will be examined with special attention to three techniques currently used in this area — Hipo, PSL and structured analysis and design techniques (SADT), including measures of their effectiveness.

SADT will be described in detail, including an example of its application, by Peter Freeman, Softech, Inc.

- **Computer System Capacity Planning and Performance Evaluation.** A number of techniques in computer system ca-



Tabcard Holders
supplying holders for
all types of D P systems
BEEMAK PLASTICS
7424 Santa Monica Blvd
Los Angeles Cal 90046 213 876 1770



THE COMPUTING SYSTEM YOU'VE BEEN LOOKING FOR.

If you're responsible for a company subsidiary, division, department or operation with an eight-figure annual budget. And, if you're looking for your own computing system to handle your data processing workload. Then you know, and we know, you've got a tough job.

Because, up until now, you've been relying on someone else's computer—either in-house or timesharing. And, chances are, that computer is IBM-oriented. So, what you're looking for in your own computing system is one most like what you've been using.

And that's where your difficulties begin.

Since you can't find a system that will let you do things the way you're used to doing them, you face monumental problems. With program conversions. With people training. And, with hardware costs.

You're also concerned about adding applications to the system as your operations grow. And, you're worried about back-up before you even worry about start-up.

At best, you now find yourself trying to find a system that will solve just some of your problems. You're willing to compromise on the other problems. And, in the end, you'll settle for some kind of a system you can call your own.

Scheduled to Run Concurrently With NCC

pacity planning will be reviewed. Attendees will learn what quantities to measure, how to obtain necessary measurements and how to apply measurements to existing problems.

Benchmarking and modeling will be discussed and case studies will be reviewed. Emphasis will be on the capabilities and limitations of current tools and techniques, plus application of performance evaluation. It will be presented by Dr. Jeffrey P. Buzen of BGS Systems, Inc.

- **An Overview of Distributed Processing** will provide an introduction to distributed processing systems including data communications and networks, minicomputers, terminals, distributed data bases, management, measurement and security.

Emphasis will be on providing attendees with a basic understanding of developing terminology as well as the current state-of-the-art, according to its presenter, Marshall D. Abrams of Integrated Computer Systems, Inc.

- **Managing and Motivating DP Professionals.** Factors which motivate or fail to motivate subordinates will be identified in this seminar intended for the DP manager or those planning a career in management of the DP function. Emphasis will be on effective management strategies for immediate on-the-job application.

Participants will learn to identify performance problems, determine their causes and implement appropriate strategies to encourage superior performance. It will be presented by D. Grote, Performance Systems Corp.

- **How's and Why's of Effective Computer Negotiations** will cover various aspects of negotiations, including assembling the negotiating team, establishing and assigning priorities involving financial and contractual objectives, considering equipment and financing alternatives and planning and implementation of negotiations with emphasis on techniques, tactics and checklists. Kenneth G. Brindle of International Computer Negotiations, Inc., will present the session.

- **Business Protection from Computer Crime and Accidental Loss.** This course will convey actual loss experience with emphasis on computer crime. A strategy for effective security will be outlined that differentiates between protection from accidental loss and intentionally caused losses.

Emphasis will be on identification of vulnerability based on DP occupations, the major source of vulnerability. Scenario techniques will also be employed by Donn B. Parker, SRI International.

- **Cryptographic Protection in Computer Systems** will cover the basic principles of cryptographic algorithms and systems with emphasis on differences between block and stream ciphers. Included will be a description of a cryptographic algorithm developed by IBM and accepted by the National Bureau of Standards as a federal standard.

Also slated for discussion are cryptographic methods for communications security, message authentication and generation and management of cryptographic keys. Principle instructor will be Richard E. Lennon of IBM's Systems Communications Division.

- **Designing the Data Base System Project** will review the planning and design of an optimum data base system project and generation of its requirement statement.

Emphasis will center on determination of a staged development plan, development of a requirements statement, initiation of a data dictionary, establishment of required architecture, plus creation of a project cost/benefit model and implementation planning. It will be presented by Leo J. Cohen of Performance Development Corp.

- **Hands-On Microcomputer Software/Hardware Workshop** will introduce fundamental principles of single-board microcomputer software/hardware interaction through hands-on exercise.

Led by Eric R. Garen of Integrated Computer Systems, Inc., each participant will gain experience in program manipulation of CPU registers, stack pointer operations and memory conventions, as well as memory addressing and program debugging.

Well, prepare yourself for a pleasant surprise. You don't have to just settle anymore, because National CSS, Inc. is introducing the NCSS 3200 Series of computing systems.

370-COMPATIBLE. With the NCSS 3200 you can continue to do data processing the way you always have because the NCSS 3200 is 370-compatible. That's the way the operating system was designed over 10 years ago. It's 370-oriented which means you don't have to worry about program conversions. Or retraining your people.

POWERFUL OPERATING SYSTEM. With the NCSS 3200 you get the software power and versatility of a mainframe—but in a minicomputer package. So, when you consider price/performance, our mainframe architecture and minicomputer price puts you well ahead of the game.

FULL BACK-UP. With the NCSS 3200, should peak loads occur, you are completely backed up by the NCSS timesharing network of large-scale computers—linked by 70,000 miles of leased lines to 80 dial-up locations nationwide. This same network is also available to you for applications development both before and after your new NCSS 3200 arrives.

So, if you're looking for your own computing system, take a look at our brochure about the new NCSS 3200 Series. We think you'll find what you've been searching for.

Write or telephone toll-free:

NATIONAL CSS
187 Danbury Road
Wilton, Connecticut 06897
(800) 243-6119
In Connecticut: (800) 882-5575

Growing Federal Users Group Sets Conference

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The Federal ADP Users Group (Fadpug) has begun to rise in the constellation of advisory groups, lobbyists and special interests that are so much a part of the Capitol City scene.

Thirteen members of the government-sponsored organization of federal, state and local government employees currently serve on the President's Reorganization Project team that is inquiring into the need for reorganizing of federal DP resources, the group's president, Paul D. Oyer, noted.

The user group also takes credit for influencing the final version of the Computer Sciences Occupational Standard announced by the U.S. Civil Service Commission a year ago. "The standard is the first professional computer job description the federal government has had," according to Oyer, who is a planning officer of the Treasury Department's Office of Industrial Economics.

Paul D. Oyer

Begun in 1970, Fadpug has grown from 407 members in mid-1976 to over 1,700 members today. One further sign of the organization's health is its first major conference, to be held here June 1-2 with the goal of examining the need to integrate management systems with information systems in the federal government in the 1980s.

The conference, titled "Managing Tomorrow's Information Technology: The Key to Improved Government Operations," will provide a forum for Fadpug's special interest groups.

Fadpug has eight special interest groups — career development and training, management graphics, privacy and security, DP procurement, DP standards, software, the user's involvement in systems and new technology and zero-base budgeting and DP. They plan a program aimed at going beyond data processing and communications to the government operations these tools aid, Oyer stressed.

People "in the computer field tend to believe that the DP tail should wag the government operations dog. That should not be the case," the Fadpug president stated, adding, "On the other hand, we don't want to be the unrecognized tail that drags in the dirt."

Fadpug and its members have been frustrated by the lack of DP involvement in the policy decisions agencies make, he said. Too often, the DP function in an agency is called in after decisions have been made and told to implement a project that might not be amenable to automation.

"DP people are as much to blame as their nontechnical managers," Oyer admitted. "We simply don't communicate in English."

Three Users Eyed

Aimed at three kinds of "users" — those who use the output of computer services, those who produce that output and government policymakers — the Fadpug conference hopes to draw a crowd of 300 to 400 people and to get DP and nontechnical attendees to talk to each other, Oyer said.

The meeting will focus on two themes: the development of improved DP and information policies and enhanced government productivity through DP and communications. Charles P. Lecht, president of Advanced Computer Techniques Corp., and Frank Carr, commissioner of the General Services Administration's ADP and Telecommunicatons Services, will deliver major addresses in these respective areas.

Societies/ User Groups

The conference will center on policy the first day and on productivity the second day, Oyer noted. There will also be a small number of exhibits, largely time-sharing services and modeling systems, geared toward the interests of program and line managers.

Fadpug was given impetus in the late 1960s because the federal government had lost its pioneering stance in the introduction of DP and telecommunications, the organization's president believes. "We want the government to lead again in the 1980s the way it did in the 1950s," Oyer said.

The user group plans to honor Rep. Jack Brooks (D-Texas) at the June conference, presenting him with the first "Fadpug Man-of-the-Year Award" for his impact on the government's use of DP and communications.

Fadpug charges no membership dues, but will charge a fee of $150 for its conference. Anyone interested is invited to attend the meeting and should write to USPDI, Inc., Conference Manager, 719 Belgrade Road, Silver Spring, Md. 20902.

ANNOUNCING
CORPORATE CONTROL OF
CORPORATE COMMUNICATIONS.

As Technology Changes in '80s

Firms Seen Hiring Philosophers, Therapists

By Howard A. Karten
CW Staff

NEW YORK — Technological change and the accelerating rate of that change in the 1980s will force busineses to hire several types of employees new to the corporate world, according to Charles P. Lecht, president of Advanced Computer Techniques Corp. here. Among these will be corporate philosophers, psychologists, semanticists and pilots.

Lecht's firm already has a company psychologist who comes in to help talk over employees' complaints. Delegating this job to a psychologist rather than trying to deal with these types of problems himself saves him two days a week, he said.

Keynoting a recent Mid-Atlantic Computer Expo '78 session on managing people problems, Lecht called on present programming languages "garbage," saying the only natural thing about Cobol is the shape of the letters.

The man-machine interface of the future will change "enormously," he forecast, bringing a sudden and massive unemployment of programmers some time in the 1980s. The vocational keys to the future, he said, are library science and linguistics: "Read Japanese or German, it'll guarantee your future."

In a rambling, often humorous speech, Lecht predicted the 1980s would see, in addition to orbiting communications satellites, spaceborne computers. The advantages of "the service bureau in the sky," as he called the development, would be in its maintainability and endurance.

With no need for air conditioning and no biodegradation or other forms of wear and tear, "computers in the sky" would never wear out, he claimed.

Discussing the impact of present and future technology on the structure and content of business conduct, Lecht drew three conclusions. First, he said, training programs, as they now exist will be replaced by an emphasis on the need for "the whole man," not merely the specialist. Secondly, employment of programmers and systems analysts will increase until a natural, easy-to-use man-machine interface exists. At that point, large numbers of these specialists will be unemployed, he predicted.

Universal Incompetence

Citing what he believes will be another important consequence of the changing technology, Lecht said "we will be unable to disguise our inability to think."

The last 10 years, he said, have served to demythify "the idea of a vast difference between the top and bottom of a corporation." One of the things discovered about business, he added, is that "corporations are successful and managements are not running them," indicating it is uncertain just who is running them.

Expanding on his theme of universal incompetence, Lecht, the author of four books on the subject of computers, stated there is good news and bad news attached to the recognition of ineptitude. The bad news, he said, is that it is universal; the good news is that "when it is found out, there will be no change."

"Businessmen and intellectuals will be the heros of the future," Lecht contended, and "companies will boast of the intellectuals and brains on their staffs."

Organizational charts will also change, he said, tomorrow's charts illustrating not only hierarchical structures within organizations, but emotional, technological and administrative dimensions as well.

Booklet Details Foreign Laws On Data Privacy

WASHINGTON, D.C. — The U.S. Department of Commerce has completed its compilation of "Selected Foreign National Data Protection Laws and Bills" and that publication is now available.

Produced by the Office of Telecommunications (OT) — now part of the National Telecommunications and Information Administration (NTIA) — the compilation includes English translations and summaries of data protection laws from the Federal Republic of Germany (promulgated in 1977), France (1978) and Sweden (1973) and bills from Belgium (dated 1977), Denmark (1977), Luxembourg (1977), Norway (1977) and Spain (1976).

The publication also consists of the Council of Europe draft resolution of an international convention on the protection of individuals whose records are part of automated systems (January 1978).

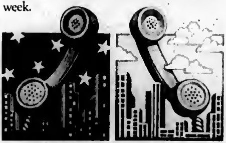
Edited by Charles K. Wilk, the compilation is catalogued OT Special Publication No. 78-19. It can be obtained for $3.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. The publication's stock number is 003-000-00536-R.

PROBLEM:

You run a company with far-flung operations and rising phone bills. You want a better way to control both.

You want your communications to speed the work your people do, not frustrate them. To enable them to dial calls faster and not have to keep redialing when lines are busy.

You want access to a system that will let you make business calls from home or on the road, 24 hours a day, 7 days a week.



You want to be able to break out charges and allocate them by profit centers or even by individuals.

You want your communications system to monitor itself, to pinpoint troubles. A flexible system you can modify in response to personnel moves and day-to-day requirements.

In short, you want a system you can control, one you can change as your business changes.

It's here!

SOLUTION:

Introducing a sophisticated system that gives your company control of its communications. Tell it what to do, and it does it. Automatically. Company-wide.

It's called Electronic Tandem Switching (ETS), a way to extend the advantages of Bell's famous Dimension® PBX to all locations on your corporate network.

By bringing together the various elements of your company communications into one, total, integrated system tailored to your specific needs, ETS does just about everything you've told us you want.

It offers over 150 capabilities to fit your individual needs, whatever they may be. It can select the most economical route for every call. It can redial busy numbers automatically and can assure immediate completion of high-priority calls. It can keep minute-by-minute calling records. It provides hands-on management and control, including the setting up of individual calling privileges and restrictions.

We have teams of problem-solvers ready to fit a Dimension ETS system to your operations and your budget. If you haven't talked systems with your Bell Account Representative lately, your company's missing something.

The system is the solution.

Bell System

Aimed at Reducing Pollution

Coast Guard Unit Tracking Marine Safety Data

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — In an effort to reduce the pollution in U.S. ports from both foreign and U.S. vessels that are failing to comply with federal regulations, the U.S. Coast Guard has begun monitoring their comings and goings and their operating records with a computerized information system.

President Carter directed that that the Marine Safety Information System (MSIS) be established following a rash of foreign tanker accidents in U.S. waters during the winter of 1976. At that time, the President ordered the Coast Guard to board and examine all foreign flag tankers entering U.S. ports and to establish an information system to keep track of the safety and pollution records of all vessels.

Using the MSIS since September, captains of the port, marine safety offices and marine inspection offices on the Atlantic, Gulf and Pacific coasts, the Mississippi River system and the Great Lakes can obtain vessel histories through a telephone dial-up link to Texas Instruments, Inc. Model 743 terminals located in 51 port captains' offices and 12 district offices, according to Lt. (j.g.) Christopher Young of Coast Guard headquarters.

The terminals access the Department of Transportation's IBM 370/158 located in Valley Forge, Pa.

The four categories of information maintained in the MSIS data bank are violation histories, boarding and inspection histories, casualty records and pollution incidents. The most important data is included in the boarding and inspection records, Young said, since that is where daily minor and major deficiencies are recorded.

All vessels required to give advance notice of arrival to Coast Guard port captains are included in the MSIS, including tankers and general cargo vessels but excluding fishing vessels and pleasure craft.

"First thing in the morning," Young said, the port captain accesses the system for information on all vessels coming into the port that day. For example, if 20 large oil tankers are scheduled to pull into a port in one day, the port captain would consult a printout of the histories of each one to determine which ones he might just "spot" for the "hookup" and "disconnect", Young said.

If a vessel had a history of oil dripping or leakages, the Coast Guard might want to observe the whole process of oil transfer to see whether human error or faulty equipment is involved.

The real effectiveness of the system is in the maintenance of accumulated histories of vessels, Young explained. In addition to advising the port captain if a vessel was in compliance with safety and environmental protection regulations during previous inspections, boarding and examination personnel can check their findings against previous examinations to see whether violations have been corrected.

HIS Gives Mini To Hub School

BOSTON — Honeywell Information Systems, Inc. has donated a Level 6 minicomputer to Boston University. The system will be used in research into how human beings move.

Given to the school's Health Sciences Department at the Sargent College of Applied Health Professions, the system will be located in the Human Performance Engineering Laboratory, where it will be used by graduate students and faculty.

The computer will facilitate studies on the appropriate treatment and rehabilitation of neuromuscular disorders, according to a university spokesman.

The system will also be used to summarize and analyze a wide variety of data on structural and functional characteristics of the human body as that data relates to motor performance, rehabilitation and occupational health and safety.

An industrial project for which the machine will be used is anatomical and physiological stress testing in industrial settings. It is hoped the results of such studies will be used to make industrial work areas and tools safer and more efficient, the spokesman said.

Nasis Meeting Set for Denver

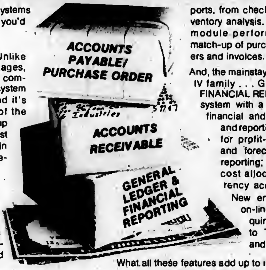
LEXINGTON, Ky. — The annual meeting of the National Association for State Information Systems (Nasis) will be held this year in Denver Aug. 14-16.

Denver was the scene of the organization's first meeting 10 years ago.

Among the topics to be discussed are the federal DP reorganization study, the Comptroller General's guidelines for DP cost accounting and recovery planning for man-made or natural disasters.

Complete program details and reservation materials will be available soon from the group at P.O. Box 11910, Lexington, Ky. 40578.

Want a faster, cleaner, user-oriented financial application system? ACCOUNTING IV®... right off the shelf and right on the money.


ACCOUNTS PAYABLE/ PURCHASE ORDER
Industries
ACCOUNTS RECEIVABLE
GENERAL LEDGER & FINANCIAL REPORTING

A lot of off-the-shelf accounting systems can make you wish that's where you'd left them . . . on the shelf.

But not ACCOUNTING IV . . . Unlike other financial application packages, ACCOUNTING IV is as flexible and comprehensive as a custom-built system costing five times as much. And it's easy-to-use — requires none of the special programming that ties up valuable DP time and makes most packaged systems unduly slow in getting information back to the requesting party.

There are four members of the ACCOUNTING IV family — each providing smooth integration with existing programs, each written totally in ANS Cobol, and each boasting a wealth of unique features that makes it easy to install and easy to adapt to the user's needs.

ACCOUNTS RECEIVABLE, for example. A fully integrated module providing tight monetary controls, a wide range of billing options, and complete automation of every receivables function. Over 25 management reports available to suit the user's requirements. Everything from detail aged A/R to sales analysis by product.

Or ACCOUNTS PAYABLE. An extremely flexible system offering more than 50 statistical and informational reports, from check reconciliation to inventory analysis. The Purchase Order module performs the three way match-up of purchase orders, receivers and invoices.

And, the mainstay of the ACCOUNTING IV family . . . GENERAL LEDGER & FINANCIAL REPORTING. A powerful system with a broad data base for financial and statistical collection and reporting. Offers capabilities for profit-planning, budgeting and forecasting, responsibility reporting; transaction analysis, cost allocation, multiple-currency accounting, and more. New enhancements include on-line data entry and inquiry as well as interfaces to TOTAL, IDMS, DL/1 and IMS data bases.

What all these features add up to is an entirely new level of control over business operations. A strong claim? Yes, but one that over 250 companies have already seen us make good on.

So contact Informatics today and let us show you how in as little as four weeks you can be up and running with an accounting system that's right off the shelf and right on the money.

ACCOUNTING IV is sold and supported by Informatics Inc., the world's largest independent software vendor.

informatics inc Software Products
World's Leading Independent Supplier of Software Products

Member SIA Software Industry Association

Informatics Inc., Software Products
21050 Vanowen St., Canoga Park, Calif. 91304 (213) 887-9121
Please sand literature on:
☐ General Ledger & Financial Reporting.
☐ Standard Product Cost
☐ Accounts Payable. ☐ Accounts Receivable.
☐ I would like to attend a frea ACCOUNTING IV seminar. Please send dates and tell ma whan the next seminar will be in my city.

Nama__________
Position__________
Dept.__________ Computar__________
Firm__________
Address__________ Tel.__________
City__________ State/Province__________ Zip__________

IN DEPTH

IN DEPTH

IN DEPTH

IN DEPTH

Data Base Systems: Design, Implementation And Management, Part I

By Ronald G. Ross

DATA BASE MANAGEMENT SYSTEM (DBMS): *A computerized system consisting of numerous components which have as their collective purposes the implementation, management and protection of large-scale data bases.*

DATA BASE SYSTEM (DMS): *A system designed as a facility for the reporting of data from a master file in multiple sequences, usually in a single pass. A DMS exhibits some, but not all, of the features of a DBMS and is, by comparison, more highly oriented toward retrieval and reporting capabilities. Certain varieties of inverted systems are also classified as DMS.*

Mainframe data management software can be classified into four groups representing qualitatively different approaches to the data management problem:

- Physically linked DBMS (hierarchical and network data structures).
- Inverted DBMS (with support for interfile relation).
- Inverted DMS (without support for interfile relation).
- File-pass DMS (sophisticated report generation).

The boundary between inverted DBMS and inverted DMS is somewhat ill-defined since upgrading from the latter to the former is relatively simple. Other factors are involved, however, such as the size of applications that may be supported, on-line access support, support for concurrent access and the integration of multiple record types.

In addition, there are programmatic means for circumventing the file relation problem, although in order to do so, the user must ply the data structure.

File-pass DMS, by comparison, is a relatively fixed class, and is largely restricted from evolving into full-scale DBMS. DMS of this class often support interfaces with physically linked DBMS, thereby providing significant user-oriented enhancements to those systems. File-pass DMS tend to be predominantly batch-oriented.

Commercially available mainframe software is shown in Figure 1 in three categories loosely corresponding to these four groups (inverted DMS have not been segregated into a distinct class). A number of the systems listed actually represent *families* of systems, the members of which cut across software and hardware versions.

Within the classification presented here, two types of DBMS have been grouped into the category of physically linked DBMS: hierarchical and network systems. Although these two types of systems are often contrasted, in comparison with other types of data management software, they actually exhibit more similarity than difference.

The dependence on physical linkage for data structuring is, of course, the major feature of that similarly. Physical linkage implies that addresses of related records are stored within records themselves so that linkage "paths" exist within and among physical files. The DBMS follows these paths in order to access data.

By way of contrast, inverted DBMS depend on the segregation of data values for given record fields and on their organization into index files, with pointers back to the original data. To effect data access, the inverted DBMS mostly operates on the indexes themselves, prior to actual record access.

Within the physically linked class, hierarchical and network systems are basically distinguished by the way they conceptualize the relationships

(Continued on Page 18)

PHYSICALLY LINKED DBMS

System	*Vendor*	*Type*
IMS/VS	IBM.	hierarchical
TOTAL	Cincom Systems, Inc.	network
DMS-II	Burroughs	mixed
I-D-S/II	H.I.S. (Honeywell)	CODASYL
IDMS	Cullinane Corp.	CODASYL
DMS 1100	UNIVAC	CODASYL
DMS/90	UNIVAC	CODASYL
DBMS-10	Digital Equipment (DEC)	CODASYL
EDMS	H.I.S. (formerly Xerox)	CODASYL

INVERTED DBMS

System	*Vendor*
SYSTEM 2000	MRI Systems Corp.
ADABAS	Software AG
Model 204	Computer Corporation of America
DATACOM/DB	Insyte Corp. (formerly C.I.M.)
DMS-170	Control Data Corp. (CDC)
INQUIRE	Infodata Systems, Inc.

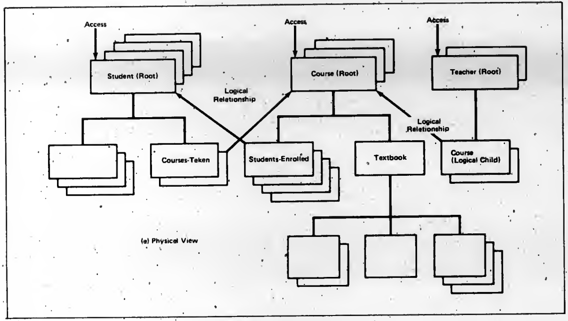
FILE-PASS DMS

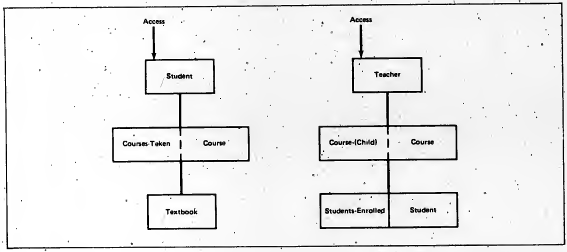
System	*Vendor*	*DBMS Interface*
MARK IV	Informatics, Inc.	TOTAL, IMS
Easytrieve	Pansophic Systems, Inc.	TOTAL, IMS, ADABAS
ASI-ST	Applications Software, Inc.	TOTAL, IMS
Data Analyzer	Program Products, Inc.	TOTAL, IMS, ADABAS
CULPRIT	Cullinane Corp.	TOTAL, IMS, IDMS, DATACOM/DB

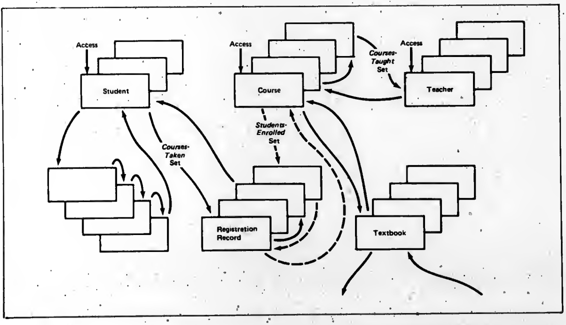
OTHER SYSTEMS

System	*Vendor*
MAGNUM	Tymshare, Inc.
NOMAD	National CSS, Inc.
RAMIS	Mathematica, Inc.

Figure 1. There are many file-pass DMS; only the most widely implemented mainframe systems are listed above.







(Continued from Page 17)

between segments or records — that is, by the way they structure the data model. For IBM's IMS/VS — the major representative of the hierarchical family — data is structured into trees which may be "logically related" (by physical linkage in most cases) into a network-like arrangement.

"Logical views" of data related in this fashion are remodeled in order to appear hierarchical to the user.[1] In network systems, which include the Codasyl systems and Cincom Systems, Inc.'s Total, the emphasis is placed on *sets* of records, which are normally linked by physical means. A given record may be involved in many sets, as defined within the Data Definition Language (DDL).

Figures 2, 3 and 4 illustrate the varying conceptualizations of a hypothetical school data base in a hierarchical and in a network sustem. As the figures demonstrate, differences arise in the structuring of an identical data model.

For example, the hierarchical approach sometimes requires an extra record type to effect linkage between files, particularly in the case of a one-to-many set relationship. This is the relationship that holds between the teacher file and the course file in Figure 2; unlike the network structure, the hierarchical structure requires a record type that specifies the *courses taught* logical relationship.

When the relationship between records becomes many-to-many — for example, if a course is to be taught by more than one teacher — then an extra record type is required by either structure. This is the type of relationship that holds between students and course records in the school data model.[2]

Theorists contend that the hierarchical view is in fact a special case of the network model and that the set terminology of the latter is more precise. From the perspective of traditional methods in data processing, however, the hierarchical view represents less of a departure; for example, the typical Cobol record description may be easily represented by a tree structure (each OCCURS becomes a repeating segment type).

In spite of the differences between the hierarchical and network models, the dependence on physical linkage for DBMS of this class results in several concerns that are largely identical for any member DBMS. The first of these concerns is navigational access,[3] which characterizes programming in physically linked systems.

Navigational access means that "po-

Figure 2. (top) shows a sample conceptualization (schema) of a school data base by a hierarchical DBMS; Figure 3 shows the logical views of that data base; and Figure 4 (bottom) shows a sample conceptualization of the school data base by a network DBMS.

sition" in the data base is established on the basis of the currently accessed record. The programmer must then supply information so that the DBMS can "choose" between paths to get the next record.

It is important to note that, for the programmer, paths exist within the data structure; in all cases, the DBMS is responsible for access at the storage structure level. Path selection is typically a matter of specifying function, record (or set) type and key value(s) where appropriate. After each access, status checking is required to ensure that the operation succeeded as intended.

A second concern in physically linked DBMS, related to data base design rather than programming, is the definition of paths that match navigational requirements in direction, volume and type. This definition requires, on the one hand, adequate analysis of the data model and its use and, on the other, appropriate selection of pointer types within the DDL for the data structure; in other words, it is a question of both "where" and "how."

The list in Figure 5 presents various options in the definition of pointer types, along with typical functions in navigational access.[4]

The similarity of the concerns in physically linked DBMS, whether under IMS/VS or a Codasyl system, demonstrates a correspondence of function between these systems. This correspondence has recently been matched by a convergence of operational capabilities.

Univac's DMS 1100, for example, supports an indexed sequential RECORD LOCATION MODE (entry-point access), indexing and variable-length records — all also offered by IMS/VS under the Vsam access method (enhanced Isam). These similarities are often obscured by the more noticeable, yet less significant, differences in data structuring.

Pointer Types

IMS/VS

SNGL A pointer to the first occurrence of a subordinate segment is placed in the parent.

DBLE Pointers to the first and last occurrences of a subordinate segment are placed in the parent.

HIER A pointer to the next segment occurrence is placed in each occurrence of given segment types.

HIERBW Pointers to the next and previous segment occurrences are placed in each occurrence of given segment types.

TWIN A pointer to the next segment occurrence is placed in each occurrence of a given segment type.

TWINBWD Pointers to the next and previous segment occurrences are placed in each occurrence of a given segment type.

LPARNT A pointer to a segment occurrence in another data base is placed in a given segment occurrence.

CODASYL

SET: MODE IS CHAIN [LINKED TO PRIOR]
- If LINKED TO PRIOR clause is included, pointers to the next and previous record occurrences are placed in each record occurrence of a set.
- If LINKED TO PRIOR clause is omitted, a pointer to the next record occurrence is placed in each record occurrence of a set.

MEMBER: [LINKED TO OWNER]
- If LINKED TO OWNER clause is included, a pointer to the owner record occurrence is placed in each record occurrence of the given type.
- If LINKED TO OWNER clause is omitted, no pointer is stored.

Access Functions

IMS/VS

GET UNIQUE Access a segment occurrence on the basis of supplied keys.

GET NEXT Access the next segment occurrence within the tree structure on the basis of current position and supplied information.

GET NEXT WITHIN PARENT Access the next segment occurrence under a given segment on which position was previously established.

CODASYL

FIND . . . USING Access a record occurrence of a set on the basis of item values.

FIND NEXT . . . Access the next record occurrence within the data base on the basis of current position and supplied information.

FIND CURRENT . . . Access the record occurrence on which position is established, supplying set and record information.

FIND OWNER . . . Access the owner record occurrence of a given set.

Figure 5

Data Structuring

Before proceeding to a discussion of inverted DBMS, it is worth noting that the data structuring involved in the hierarchical and network models may be implemented by inversion as well as by physical linkage. MRI System Corp.'s System 2000, for example, — an inverted DBMS — follows the hierarchical model.

The Codasyl specifications allow for implementation by inversion, although DBMS of that group up until recently tended not to support it.

From this, it is clear that the distinction between physically linked DBMS and inverted DBMS is basically defined by characteristics at the storage structure level (that is, by access methods), whereas the distinction between hierarchical DBMS and network DBMS is more closely associated with differences in the conceptualization of data models — that is, by the data structures supported within the DDL. These several dimensions make possible the classification presented in Figure 6.

There are, however, several limitations to this classification. For one thing, physically linked DBMS sometimes offer supplemental indexing capabilities. Examples of such capabilities may be found within IMS/VS and DMS 1100.

A more significant problem is that there are a number of systems, particularly among inverted DBMS, which simply do not fall neatly within the strict hierarchical vs. network groupings. Such systems include Software AG's Adabas and Control Data Corp.'s DMS-170, which might be placed within the network class, although this does not entirely characterize their approach to data structuring.[5] Finally, there is inevitably some overlap between data structuring and access methods since the DDL is often involved in defining both. In spite of these limitations, the classification in Figure 6 is useful as far as it goes.

There are several issues in data inversion at the storage structure level that must be classified in order to reach a

(Continued on Page 20)

PRINCIPAL ACCESS METHOD

		Physical Linkage	Inversion
DATA STRUCTURING	Hierarchical	IMS/VS	SYSTEM 2000
	Network	TOTAL CODASYL Systems*	(possible)

*Support is provided within the CODASYL DDL specifications for the indexing of sets.

Figure 6. This is a classification of DBMS by data structuring and principal access method.

Biology	(Jim Jones)
Computer Science	(Jim Jones)
Computer Science	(James Smith)
Geology	(John Doe)

(a)

Biology	(Jim Jones)
Computer Science	(Jim Jones, James Smith)
Geology	(John Doe)

(b)

Figure 7. Shown are the index storage structures under (a) the indexed access method and (b) the inverted access method for the student record file in Figures 10 and 11 on Page 23.

(Continued from Page 19)

full understanding of inverted DBMS. The first of these is the distinction between indexed access and inverted access, both of which exemplify the general access method of inversion. In both cases, indexes are established apart from actual data and organized on the basis of given keys.

The indexed access methods is perhaps more familiar than inverted access because Isam (a member of the class) has had wide application. Indexed access becomes complicated beyond Isam, however, when allowance is made for duplicate keys or when the order of the indexed file is not that of the index itself.

This latter case occurs when the indexed field is *not* the primary key of the target file, and this is properly known as indexed random.

The distinctive feature of indexed access as used in DBMS (whether indexed sequential or indexed random) is that an index record is stored for every indexed record, regardless of whether other records have an identical value for the indexed field.

This is not the case for the inverted access method. Under this method, a key value is generally stored once and only once within the index, and associated with it are the addresses of all like-valued records. This distinction is illustrated in Figure 7.

The result of the inverted access technique is a more streamlined and compact index, in particular where the percentage of like-valued records is relatively high. Because inverted DBMS depend heavily on the efficiency of indexes (conservation of storage space is one relevant consideration), they tend to use this method rather than the indexed alternative.

In the process, however, the advantage of using the index as a data base in its own right (often possible under the indexed access method) is lost. In addition, indexes under the inverted access method tend to be relatively difficult to manage because the pointer arrays associated with each index value are of variable length. Much of the attention in inverted DBMS therefore centers on the construction of indexes.

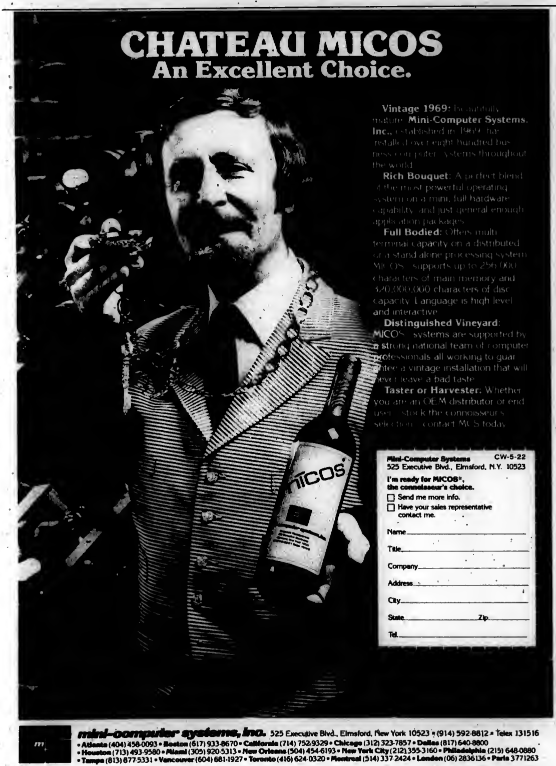
A second issue essential to understanding inverted DBMS is the distinction between partial and full inversion. Partial inversion, as the name suggests, means that only a small proportion of fields within a data base record are inverted. In a typical application, this might be 10% to 25% of all data elements, corresponding to those items most frequently used in queries or straightforward access.

A basic consideration in data base design under systems of this type is thus the frequency of item usage. In addition, it must be determined whether given items yield discriminating indexes; for example, a sex data item yields a poor index since only two data values are possible.

By way of contrast, full inversion means that *every* data element in a data base record is inverted. This makes possible a significant innovation at the storage structure level: since the data value of every data element in a record resides somewhere else in the data base (namely, in an index), the record itself *need not be stored.*

In its place, a pointer array surrogate is stored so that the record can be reconstituted if its retrieval is required.

Under this strategy, it is to be expected that the overhead of reconstituting records from surrogates will become prohibitive as the number of re-



CHATEAU MICOS
An Excellent Choice.

Vintage 1969: Beautifully mature **Mini-Computer Systems, Inc.,** established in 1969, has installed over eight hundred business computer systems throughout the world.

Rich Bouquet: A perfect blend of the most powerful operating system on a mini, full hardware capability, and just general enough application packages.

Full Bodied: Offers multi terminal capacity on a distributed or a stand alone processing system. MICOS — supports up to 256,000 characters of main memory and 320,000,000 characters of disc capacity. Language is high level and interactive.

Distinguished Vineyard: MICOS — systems are supported by a strong national team of computer professionals all working to guarantee a vintage installation that will never leave a bad taste.

Taster or Harvester: Whether you are an OEM distributor or end user — stock the connoisseur's selection — contact MCS today.

Mini-Computer Systems CW-5-22
525 Executive Blvd., Elmsford, N.Y. 10523

I'm ready for MICOS®, the connoisseur's choice.

☐ Send me more info.
☐ Have your sales representative contact me.

Name________
Title________
Company________
Address________
City________
State________ Zip________
Tel.________

mini-computer systems, inc. 525 Executive Blvd., Elmsford, New York 10523 • (914) 592-8812 • Telex 131516
• **Atlanta** (404) 458-0093 • **Boston** (617) 933-8670 • **California** (714) 752-9329 • **Chicago** (312) 323-7857 • **Dallas** (817) 640-8800
• **Houston** (713) 493-9580 • **Miami** (305) 920-5313 • **New Orleans** (504) 454-6193 • **New York City** (212) 355-3160 • **Philadelphia** (215) 648-0880
• **Tampa** (813) 877-5331 • **Vancouver** (604) 681-1927 • **Toronto** (416) 624-0320 • **Montreal** (514) 337-2424 • **London** (06) 2836136 • **Paris** 3771263

T-SHIRTS

Posters,
Memo Pads,
Sweatshirts, and
General Nonsense...

Free Brochure...25 cents

THE INCREDIBLE SYSTEMS & T-SHIRT COMPANY
Box 2623
Menlo Park, CA 94025

trieved records increases. Since many applications focus on producing sequential reports of various types, the full inversion approach is less prevalent than partial inversion among the major systems in the inverted class.

Inverted DBMS

Inverted DBMS have several advantages as well as disadvantages relative to physically linked DBMS. To summarize, the advantages are:

- The DDL is simple (structural specifications are limited basically to the designation of fields for inversion).
- Changes in data structures have less impact on application programming; also, there are fewer rules to follow in changing structures.
- Support for new linkage (relation) between existing files is easier to establish.
- Data storage is "purer" since physical support for the data structure is not contained within the data itself.
- Reorganization of data base files is less complex since files are not physically interrelated; unloading and reloading is not as often required for making structural changes.
- Ad hoc searching is strongly supported since indexes rather than data base records themselves may be examined by the DBMS.
- Programming in inverted DBMS is less involved since navigational access is not so much a factor (query languages in inverted DBMS are strong largely for this reason).

On the other hand, the disadvantages are:

- The indexes required in inverted DBMS represent significant overhead, especially where many fields are inverted.
- The overhead for update activity tends to be higher since changes to appropriate indexes are required for each update action.
- The overhead for known repetitive reporting tasks tends to be higher in inverted DBMS; in physically linked DBMS, such tasks are typically supported by direct pointers, particularly where interfile relation is involved.
- Indexes in inverted DBMS are in a sense "redundant" since data values are identical to those stored in data base records; significant storage space is required for indexes.

Although these points appear to be clear-cut, it is nonetheless difficult, if not impossible, to determine which of the systems — physically linked or inverted DBMS — is better for given tasks because this is largely system- and application-dependent. It is, however, accurate to characterize inverted DBMS as especially strong for ad hoc retrieval, in particular by query language facilities.

For this reason, systems of this type have been used more commonly in information storage and retrieval applications than physically linked DBMS, which have traditionally been associated more with production-type data and their application.

By the same token, it has traditionally been contended that physically linked DBMS are more proficient in applications where the ratio of update processing to retrieval processing is high. (The presence of chains within the data themselves eliminates the need to update segregated indexes.) However, the issue is more complex than this would indicate, and the point is not at all conceded by vendors of inverted DBMS.

These vendors (which include independents on IBM hardware) tend to be aggressive about performance and have successfully encroached upon the traditional territory of physically linked DBMS with numerous implementations. Thus traditional lines, whether fact or fancy, have blurred in recent times.

A dimension important to the success of inverted DBMS is the evolution of interfile relation capabilities within a number of systems.[7] There are several ways in which such a relation can be established. One way is by user request at runtime, which requires simply the specification of the data base files to be related and of the field on which the relation is to occur. The DBMS can then present the user with concatenated records by matching corresponding indexes.

A similar method, but one that removes the relational specification from the user, is to designate the relation of data base files within the user's subschema. The user then requests a given record type and receives, in fact, a record concatenated from several other record occurrences.

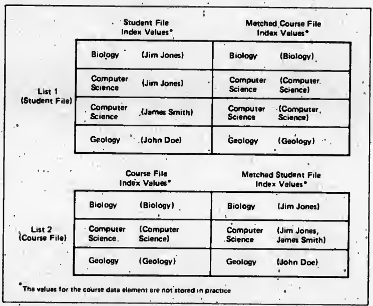
These two methods of relating files rely on the runtime matching of indexes. It is possible, however, to match up indexes *before* the request is issued in order to reduce the number of operations necessary at execution time and thus improve performance for retrieval.

In Software AG's Adabas, for example, two matched lists are kept, in addition to the regular indexes, for each related field. One of the matched lists "belongs" to each of the two data base files so that the other file may be directly accessed on the basis of matched values.

This strategy, which is illustrated in Figure 8, is especially effective for improving performance when the related field is not one for which values have previously been entered by the user in his query specification. Consistent with the keynote in inverted DBMS, the effect of this strategy is to avoid access to the data itself in order to satisfy criteria.

It is interesting to note that interfile relations established by this strategy approach physical linkage between

(Continued on Page 22)



List 1 (Student File)	Student File Index Values*		Matched Course File Index Values*	
	Biology	(Jim Jones)	Biology	(Biology)
	Computer Science	(Jim Jones)	Computer Science	(Computer Science)
	Computer Science	(James Smith)	Computer Science	(Computer Science)
	Geology	(John Doe)	Geology	(Geology)

List 2 (Course File)	Course File Index Values*		Matched Student File Index Values*	
	Biology	(Biology)	Biology	(Jim Jones)
	Computer Science	(Computer Science)	Computer Science	(Jim Jones, James Smith)
	Geology	(Geology)	Geology	(John Doe)

*The values for the course data element are not stored in practice

Figure 8. In this illustration of the interfile relation (coupling) of Software AG's Adabas, the two matched lists shown result from the merging of the indexes for the school data base presented in Figure 11 on Page 23. The two files are related on the basis of the course data element.

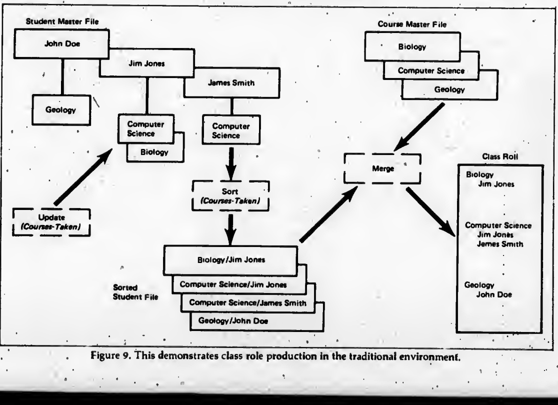


Figure 9. This demonstrates class role production in the traditional environment.

(Continued from Page 21)

the files, even though the relation remains external to the files themselves. Actual retrieval of records, however, is still basically effected by inversion, which remains the distinguishing characteristic of the system.

Data management systems — sometimes labeled report writers, although they surpass the capability suggested by that name — represent a significant counterpart to DBMS software. The total number of DMS users is comparable, in fact, to that of DBMS users.

An interesting development within the past several years has been the creation of interfaces to link the major DMS packages with DBMS systems, with the implication that DMS and DBMS can coexist within the same applications environment. From this it can be concluded that DMS serve to enhance the retrieval capability from DBMS-managed files.

In our earlier review of inversion-type systems, we noted that the differentiation between inverted DBMS and inverted DMS is rather ill-defined. This is not true for the distinction between physically linked DBMS and file-pass DMS.

The common denominator among file-pass DMS is the ability to create multiple reports (in different sequences) from a single pass of an input master file. This normally requires, of course, a sort for each sequence, although in a typical implementation, record surrogates (that is, temporary indexes) are sorted rather than the records themselves.

By contrast, a DBMS (whether physically linked or inverted) establishes a means of achieving a given report sequence *directly* — that is, by means of an ordered set or index maintained during data *storage*.

In essence, a DMS automates a more traditional method of processing; it is possible, for example, to visualize a DMS following much the same pattern for producing class roles, as Figure 8 illustrates. There are, however, significant potentials offered by the DMS. For instance, during the single pass of the file, other reports — bus schedules, homeroom lists and so forth — might be generated.

The distinction between physically linked (or inverted) DBMS and file-pass DMS is significant in that the requirements of the latter for file-pass and record sorting generally render them much less effective than DBMS in on-line and multiple update tasks. In one sense, record sorting in a file-pass DMS is made necessary by a lack of data structuring and amounts to the introduction (if temporary) of data redundancy into the system.

In general, DMS allow the continuation of traditional master file schemes, with their tendency toward data redundancy and inconsistency. Since the DMS environment is largely nonintegrated, DMS are often correctly designated file management systems.

Both file-pass and inverted DMS do, however, exhibit significant degrees of data independence. Like DBMS, DMS often suport an independent DDL (that is, a DDL apart from application programming), frequently in conjunction with data dictionary facilities. This DDL tends to be restrictive, of course; file-pass DMS usually support only sequential and index-sequential files.

Perhaps the most noteworthy feature of DMS, one particularly conducive to improving application productivity, is the provision of high-level user inter-

"OCR SAVES MONEY"

Quotes from just a few of our users

"Our Laser OCR-One has enabled us to reduce our keypunching staff by over 50%. The savings from this alone amount to about $10,000 a month."
George M. Jordan
Systems Analyst
Westinghouse Credit Corporation

"OCR data entry saves Erie County, NY $300,000 a year. We really couldn't have gotten by without scanning and our Laser OCR-One."
Gerald E. Wilson
Director of Data Processing
County of Erie, NY

"The use of the Laser OCR-One is a significant factor in the processing of our daily warehouse productivity information. Our ability to produce timely and accurate reports for this application has resulted in a cost savings of $5,000 per week."
James N. Hickey
Data Processing
Operations Manager
Allied Supermarkets, Inc.

"Our Laser OCR-One scanner has given us the ability to balance taxes faster than it's ever been done before. In addition, handling the county payroll with scanning has reduced our data processing costs substantially."
Charles E. Martin
Director
Lake County Data Processing Agency, IN

For information on how you can cut data entry costs with the Laser OCR-One system, contact

Billy Graham
Vice President/Marketing
Optical Business Machines, Inc.
804 W. New Haven Avenue
Melbourne, FL 32901
Call toll-free (800) 327-6429

I'd like more information about the Laser OCR-One

☐ send descriptive literature
☐ have a salesman call me

Name
Title
Company
Address
City
State Zip Phone Ma

DECwriter II & III
FOR SALE
• LA36 • LS120
YOU CAN'T BEAT OUR PRICE
800-323-2288
IN ILL. CALL 312 [illegible] 1960
[illegible]
ICE INC
[illegible] Rd
[illegible] IL 6012[illegible]

COMPUTERWORLD

. . . the one
weekly newspaper
that's designed to fulfill your
unique "need to know" . . .
the one newspaper that can
give you all the current
information you need to benefit
you, your organization and
your career progress . . .
52 weeks of incisive news,
commentary and special
reports . . . subscribe today,
use the attached postage paid
order form.

☐ *Please enter my subscription*
(details on back)

☐ *I'm already a subscriber,*
but I'd like you to
change my:
☐ *address*
☐ *title*
☐ *industry*
☐ *other*

My current mailing label is attached
and I've filled in new information
on the other side

Put old label or label information here

RATES United States – $18 Canada and PUAS – $28
Europe and Near East — $75 All Other Foreign — $125

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ ☐☐☐☐ (MC Only List four digits above your name)

If charge we must have cardholder's signature ______________________ Expiration Date ____________

First Initial		**Middle Initial**		**Surname**	
Your Title					
Company Name					
Mail To					
City		**State**		**Zip Code**	

Address shown is
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld*

☐ Check here if you are interested in receiving information on *Computerworld's* Index

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

- **10** Manufacturer of Computer or DP Hardware/Peripherals
- **20** Manufacturer (other)
- **30** DP Service Bureau/Software/Planning/Consulting
- **40** Public Utility/Communication Systems/Transportation
- **50** Wholesale/Retail Trade
- **60** Finance/Insurance Real Estate
- **70** Mining/Construction/Petroleum/Refining
- **75** Business Service (except DP)
- **80** Education/Medicine/Law
- **85** Government - Federal/State/Local
- **90** Printing/Publishing/Other Communication Service
- **95** Other ____________

- **11** President/Owner/Partner/General Manager
- **12** VP/Assistant VP
- **13** Treasurer/Controller/Finance Officer
- **21** Director/Manager of Operation/Planning/Administrative Service
- **22** Director/Manager/Supervisor DP
- **23** Systems Manager/Systems Analyst
- **31** Manager/Supervisor Programming
- **32** Programmer/Methods Analyst
- **41** Application Engineer
- **42** Other Engineering
- **51** M'fg Sales Representative
- **52** Other Sales/Marketing
- **60** Consultant
- **70** Lawyer/Accountant
- **80** Librarian/Educator/Student
- **90** Other ____________

Detach here, fold, and place in post-paid envelope attached through binding.

face languages, which in many cases eliminates the need for cumbersome Cobol programming. An immediate result of this is a greater responsiveness to ad hoc requirements — an area in which DBMS are often significantly wanting.

DMS of the file-pass sort exhibit an additional capability: the ability to relate multiple files. Again, however, this capability is restricted in comparison with DBMS.

For DMS, a related file is often labeled "coordinate"[8] and is normally indexed sequential in organization. A key from the master file (or from another appropriate source) serves as a means of entry into the coordinate file *at run time* via its primary index. Many files may be "related" in this manner.

In summary, it may be said that DMS automate and enhance the activity normally associated with master file processing, although they do not achieve the integration of data and associated benefits available in DBMS. Nonetheless, they are viable alternatives in many environments and may in fact not be as distant from the mainstream of data base evolution, as is often thought.

Notes

[1] This requires the generation of pseudo data base descriptions, called logical DBD, using a simple subset of the regular DDL. Logical DBD follow paths established in the physical DBD.

[2] In the hierarchical data structure in Figure 2, two record types are shown effecting linkage between student and course records. In practice, one or the other of these can be "virtual," that is, not actually stored. It should be noted that the *courses taught* set in Figure 4 cannot be directly implemented in Cincom's Total, even though that DBMS is classified as a network system. Distinctions like the one between hierarchical and network data structures are often subtle but nonetheless significant in implementing data models. The major feature distinguishing network from hierarchical data structures is the view that the programmer "sees." Hierarchical views are supposedly easier for the programmer to use, although under existing DBMS the point is debatable.

[3] Navigational access is a term suggested by Charles W. Bachman, winner of the 1973 Association for Computing Machinery's Turing Award and principal architect of I-D-S, prototype for the Codasyl model. Navigational access in the hierarchical model is referred to as "tree traversal access."

[4] The pointer types shown for IMS/VS may be mutually exclusive in some cases. Not all options are given. The Codasyl pointer options are taken from the 1971 Codasyl Data Base Task Group Report, on which most current Codasyl DBMS are based. The access functions for the Codasyl model are taken from the 1976 Codasyl Cobol JOD and do not include all possible variations.

[5] These systems are sometimes characterized as relational, although they do not implement the relational model in full. The relational model itself is an addtional problem for the classification in Figure 6.

[6] Secondary indexing an IMS/VS is of this type. As mentioned previously, file level support in a DBMS is often provided by the operating system. This means, for example, that in index file in IMS/VS may itself be managed by Isam or Vsam, with the implication that the index is itself indexed. The result is a pyramiding access structure that improves overall performance. In this discussion, "index" refers to the data base index rather than to any lower-level index.

[7] Such capabilities include "coupling" in Adabas, "connection" in Inquire, "link" in System 2000 and "join" in DMS-170. A good deal of variation exists in the nature of these various implementations, as well as in their complexity. Interfile relation is an important, but not the sole, ingredient in distinguishing between inverted DBMS and inverted DMS.

[8] This corresponds to "indexed coordinate" files in Informatic's Mark IV.

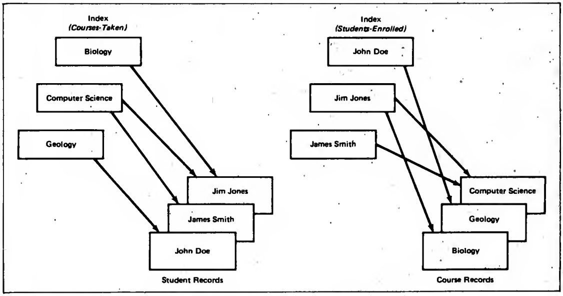


Figure 10. This is an inverted structure for the school data base.

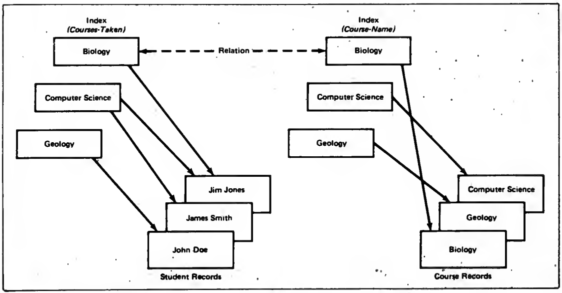


Figure 11. The same data item is inverted within distinct records.

Ronald G. Ross is senior staff consultant for data base systems at Performance Development Corp. in Princeton, N.J. He is the author of many articles and monographs on topics that range from data base administration to trends in data base management systems packages. Typical are "DBMS," An Overview of Data Base Technology from Government Data Systems *and "The Data Base Administrator: What Is His Place?" from the* Journal of Systems Management.

Ross, who is 27, graduated from Rice University with honors and holds an M.S. degree from the Illinois Institute of Technology.

The above article is reprinted by permission of publisher from Data Base Systems *by Ronald G. Ross, Chapter 3, copyright 1978 by Amacom, a division of American Management Associations. All rights reserved.*

Editorial

A Sad State of Confusion

A recent report by faculty members at Southwest Texas State University's Department of Accounting and Computer Science concluded that most university computer science programs are not producing graduates with the expertise needed in the commercial DP environment [CW, May 8]. The report was based on a survey of DP employers.

Most computer science programs do not intend to produce DP experts. While many computer science students do graduate with DP skills and most computer science graduates — at the bachelor degree level — do seek DP jobs, DP is not computer science any more than carpentry is architecture.

There is considerable confusion on this point. The confusion prevails because most people do not understand the distinction between science and applied technology.

This confusion is dominant in the computer industry as well as in general society. It seems to be shared by those responsible for juxtaposing accounting with computer science in a university department title.

Computer science is normally taught by computer scientists — people concerned with the limits of what machines can do, the limits of what the human mind can do and the limits of what their budgets can do.

As scientists, these faculty members tend to see themselves following in the tradition of Galileo, Pasteur and Einstein or — closer to home — Turing and von Neumann. They often have little experience with the demands of commercial DP employment. If they have any personal experience with private industry, it tends not to be as applications programmers.

Computer science departments did not exist when many of these faculty members were students. Their degrees were generally earned in such disciplines as mathematics, psychology, electrical engineering and philosophy.

Accordingly, the better computer science programs emphasize theory and purport to be the gateway to a fairyland of colloquia, literature searches, and everlasting glory among the relatively obscure.

Many graduates of university computer science programs are willing and able to perform well in applied DP positions, but employers are mistaken if they assume only such graduates are qualified to take these jobs.

Thousands of experienced programmers in this country demonstrate every day it is possible to acquire applied DP skills without attending universities at all. However, there is a crying need for more applied DP training at professional institutes and trade schools or within such disciplines as business administration and applied engineering.

In many ways it is unfair to criticize computer science programs for not being applied DP. There is a need and a place for computer science as well — it is just that computer science should not be confused with business DP.

Instead of criticizing already good computer science programs, business and other concerned people should lobby for better — but different — programs that teach DP as part of a more general discipline such as business, medicine, law or even liberal arts.

'Pss-s-t, Buddy . . ., get 'em while they're hot!'

Letters to the Editor

Responsibility for Training Really Lies With Businesses

I am frankly surprised that *Computerworld* bothered to print such a self-evident and self-serving article as "DP Graduates Lack Business Savvy: Survey" [CW, May 8].

Computer science is not, has never been intended by most universities to be and probably should not be the same as data processing. Many colleges and universities are aware of this disparity and have provided curricula in information systems management or courses in data processing in their business curricula for just this reason.

Universities are not in business solely to produce graduates for entry into business. They produce graduates with strong general backgrounds in many subjects. Over a four-year period in a computer science B.S.-producing curriculum, a student will only spend the equivalent of a year in computer science courses.

A computer science graduate should be eminently qualified to be of use to any business. Businesses should be aware, however, that education does not stop with the awarding of a degree, nor does the hiring of an employee with a bachelor's degree relieve them of all responsibility for training.

Employers should be willing to train employees either in business (computer science grads) or data processing (business grads). The responsibility is with the business, not the schools.

Lawrence A. Ruh
Silver Spring, Md.

Eavesdropping Possible

The recent article on the installation of CRTs in Los Angeles police squad cars [CW, May 8] again pointed out the need for security training for everyone involved with data processing.

The article quoted Sgt. David Wiltrout, who said it would be impossible for criminals to eavesdrop on police calls "since you can't eavesdrop on digital transmissions."

I suggest that if Wiltrout contacts one of the many DP security consultants in the Los Angeles area, he will find out digital eavesdropping is possible and quite probable.

W. Socha
Phoenix, Ariz.

Guide Lists Used Prices

The article about insurance coverage for computers [CW, May 8] was misleading in at least one important respect. The article stated: "Because of the volatility of computer technology, no standard publication exists that lists prices of used computer equipment."

Since 1970 we have published the "Computer Price Guide," which contains current asking prices for most IBM computers and peripherals.

Svand E. Hartman
President
Computer Merchants, Inc.
Chappaqua, N.Y.

Neither Rain Nor Snow. .

Maybe the bad weather, new location and "lengthening shadow of NCC" affected the attendance and exhibits at Mini/Micro 78, but one major problem that was overlooked in your article [CW, May 1] was the late mailing of the promotional material.

The first I heard of Mini/Micro 78 was when the preview program arrived in my mail on April 19, when the show was half over.

It would appear (based on a mid-March date shown for the list of exhibitors) that the copy hadn't even gone to the typesetters when the show was only four weeks away, leaving only half the normal time required for bulk mail to be delivered in most areas. I would guess many copies are still in the mail.

As for me, I probably would have attended had I known about it a week or so in advance. It was a lot closer than Anaheim.

R. O. Schildknecht
Saddle Brook, N.J.

Data Past

Five Years Ago
May 23, 1973

WASHINGTON, D.C. — With tales of Watergate and other Republican political sabotage tactics rampant during the late stages of the 1972 Presidential campaign, officials in the McGovern for President campaign feared tampering with the vote-counting process itself, especially in computerized vote systems. The campaign committee set up a special section to deal with possible frauds and hired a consultant to give seminars on how to uncover vote tampering.

Eight Years Ago
May 27, 1970

FRESNO, Calif. — The Control Data Corp. 3150 system at the Fresno State College computer center here exploded when three Molotov cocktails thrown by protesting Mexican-American and black students hit the core memory. The attack followed a recommendation by an administrator that eight of 12 ethnic studies faculty members not be rehired.

— — —

NEW YORK — Honeywell Information Systems, Inc. and General Electric Co. announced a merger that would combine the computer operations of both into a Honeywell subsidiary to continue service of GE equipment and continue "development and support of the current product lines."

Suing for Workmen's Compensation

Programmer Claims Breakdown Job-Related

By Jack Stone
Special to CW

Work pressures in the typical information systems department are always troublesome, sometimes perverse and occasionally unbearable. As a result, many systems people dream about transferring to [what they perceive to be] a cozy job in academia.

But they may find a fool's paradise. I'm going to relate the tragic and pathetic story of a programmer who, after years of faithful service to a university research team, suffered a severe mental breakdown.

But this is not just a routine case of a DPer whose illness was related to the pressures of the job. This story is different because the programmer is currently petitioning the workmen's compensation board in her state to make the employer — a famous university — responsible for the illness on the grounds that scientific programming as an occupation inherently presents serious hazards to one's health.

In her petition she noted the university-provided group health insurance does not cover mental illness. But, she claimed her other sickness was incurred directly as a result of the job, she has suffered permanent disabilities which prevent her from continuing to function in her chosen profession and the university is responsible for payment of medical bills associated with the illness *plus* added compensation for the disability.

Regular Pattern

The story began more than 25 years ago, when the woman started working for the university as a mathematical assistant in an organization conducting basic research in the military and medical areas. When computing equipment was introduced, she naturally gravitated into Fortran and PL/I programming and continued to provide assistance to the scientists on the project.

This assistance followed a regular pattern. The researcher provided a complex formula or algorithm to the programmer, who coded it and checked it out with test data.

After checkout, the researcher supplied live data; the programmer ran the job and returned the results for study and analysis.

The physical environment at the university was about what you'd expect — comfortable surroundings, lots of machine time, good library. The job paid rather well and there were many fringe benefits.

Also, there was no bureaucracy to contend with and the programmer had warm feelings of independence. Indeed, she had a private office to shut out external noise and allow maximum concentration on the task at hand.

Over the years, the algorithms became more complex as the researchers advanced in their endeavors. Some of the programming tasks took weeks or months to complete, and several took a year or more.

The Human Connection

During these periods, the programmer worked alone in the office, usually seeing or talking to no one. After all, the scientists completely specified the program to be written, they certainly had the expertise to know what they were doing, and there simply wasn't a need for the programmer to communicate with the other team members.

Unfortunately, there was not a common understanding of who the team players were. She identified with the team, but was treated as a low-level clerk. She rarely was told the goals of the project, the progress toward those goals or even when the project was completed. Her contribution sometimes went unacknowledged when a project was written up in a scientific journal.

So she became more and more isolated in her office, with the door closed. Year after year, she completed one program after another, never really feeling a firm sense of participation or accomplishment.

One time, she struggled with a particularly difficult assignment for more than two years. After the code was completed, the project was dropped without a single production run. She was never told why.

In recent years, as is well known, external funding sources for universities have been limited. So tasks for the programmer became sporadic. No matter to her supervisor; he told her to stay in her office and wait for an assignment.

The doctor's report to the workmen's compensation board said that the programmer was totally disabled, having suffered an occupationally disabling psychiatric illness, that the forced isolation led to her disillusionment and loss of control over her environment, that the lack of acknowledgment led to intense frustration and feelings of abandonment — and that programming of this type is inherently an occupational hazard.

An Open Letter to FCC Chairman Wiley

The following is an open letter to Charles P. Ferris, chairman of the Federal Communications Commission (FCC), written after a federal appeals court let stand a ruling ordering AT&T to provide local interconnection facilities to MCI Telecommunications, Inc.'s Execunet service [CW, May 15].

Dear Mr. Chairman,

Yesterday your counsel, Mr. Armstrong, told me — as he told the U.S. Court of Appeals for the District of Columbia — that the Federal Communications Commission was appealing to the U.S. Supreme Court to permit AT&T to stop the pioneering MCI Telecommunications Corp. from using FCC-authorized telecommunications facilities.

He did point out, however, that he had not received instructions concerning the matter from the FCC, but said the final decision to appeal would be made within a day or so.

Quite a rush, when you consider the appeals court's decision was only published the day before.

Indeed, I think the question is being decided without the commission realizing that the real issue is whether the FCC is, and has been for years, victimizing MCI and other pioneers. A look at the records seems to indicate that this is the effect of the commission's actions in this case.

The Taylor Report
By Alan Taylor CDP

If so, and the FCC is being unfair, then the sooner something is done to stop it the better, as I think you will agree. So don't be precipitate in appealing the ruling. Let AT&T do that if it so desires, but don't let the FCC become its front man.

Of course, if you read the appellate court's order in detail, you may see why AT&T would like the commission to run interference for it with the Supreme Court. There is that little matter of AT&T going to the appellate court with the claim that Execunet would directly and inevitably lead to severe competition — and then reversing that claim the moment the Supreme Court lets the appellate court's decision stand. That's walking both sides of the street, an instance of impropriety that courts dislike. But that is AT&T's concern, not the FCC's.

After all, the history of the case gives the FCC enough to worry about without taking into account AT&T's propriety problems. There are a number of items on record concerning the commission's improprieties that are a more immediate concern.

One of these concerns, for instance, is the apparent collaboration of the FCC and AT&T in 1975 — and the way it was swept under the rug in 1976-77.

Apparently, commission members got together with AT&T representatives ex parte and then, without holding a hearing or even disclosing the details of AT&T's arguments concerning the lawfulness of Execunet. Now that wasn't very fair was it?

Then when the commission was to investigate "if any prohibited contacts had occurred," The FCC claimed the get-togethers were OK because AT&T delayed formally telling the FCC about its complaints until after the get-togethers. Apparently that makes it OK — but it still raises the question of FCC unfairness and the power to victimize.

Then, along with this switch in the FCC's position, there is the question of how the FCC (or its lawyers) can claim that somehow the FCC had actually given AT&T a monopoly in a ruling (on specialized carriers), even though it never said so at the time [CW, Jan. 30]. The court was very polite in its comments on the record, which stated that the opposite had happened.

After the specialized carrier decision, the commission acted differently than it would have if it had really intended to allow the monopoly. Apparently, the court thought a decent hint to the commission to stop playing with the records would be enough — but now we can see hints aren't enough.

I could go on, but by now the situation is plain. As the latest court opinion clearly states: "MCI has met with almost continuous resistance by AT&T in its efforts to provide communications services. We had thought that this process finally culminated in our Execunet decision upholding MCI's authority to offer Execunet pending further rulings by the commission. Now, however, we are faced with a new effort by AT&T, with the approval of the commission, to arrest the development of Execunet service . . ."

Whatever the courts may say, what is at stake is the commission's reputation.

The FCC's promise to the public back in 1970 was that "where a carrier has monopoly control over essential facilities we [the Commission] will not condone any policy or practice whereby such carrier would discriminate in favor of an affiliated carrier or show favoritism among competitors."

This should go for the commission itself, for the records indicate that by permitting AT&T to continually frustrate the marketing efforts of MCI through denying local interconnection facilities, the commission is itself a party to a discriminatory practice.

Continued "knee-jerk" appeals to the Supreme Court before carefully reading the appellate court's opinion and learning the lessons in it would confirm the "unfair to MCI" cry of the courts — and should not happen without full review and consideration of the implications.

I should be happy to hear from you on this matter.

Very truly yours,
Alan Taylor

P.S. I am one person who, with just a two-person business, would like Execunet to save me 30% on phone calls.

© Copyright 1978 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for noncommercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

Letters to the Editor

Column on DP Recruiters Hit as 'Ambiguous'

As president of Massachusetts Professional Placement Consultants, an organization of 27 recruiting agencies which adhere to a very strict code of ethics, it appalled me that a publication the caliber of *Computerworld* would print such an ambiguous, unresearched and uninformed piece of journalism as that which appeared April 24 under the heading "Readers See Some Dangers in Headhunting."

To suggest there are no abuses in the recruiting field would be incorrect, but it is also incorrect to say abuses are prevalent.

By printing this article, you did a grave injustice to recruiting firms and the personnel field in general.

David J. Melville
Wellesley, Mass.

Void in Third World

We certainly appreciate your expanded international coverage, as in articles such as "Emerging Nations Must Stretch DP Dollars" [CW, April 17].

We at Omci have been engaged in migrating DP systems to Third World countries for the past four years. We have experienced firsthand the frustrations discussed at the recent Intergovernmental Bureau for Informatics symposium.

However, we are concerned that one chronic source of these frustrations is being overshadowed by the current attack by less-than-developed countries on the business practices of IBM.

Success in informatics is directly dependent upon access to the DP technology infrastructure that has evolved in the industrialized countries. It is largely missing in the emerging ones.

In our experience, it is frequently incorrectly assumed that the computer manufacturer is the source of this broad support base. Manufacturers certainly contribute to this misconception through simplistic and unenlightened international marketing techniques.

However, since the DP infrastructure is missing in less-than-developed countries, unless it is separately provided for, computers there are destined to inefficient and ineffective use — regardless of IBM's business practices.

Implementors of DP systems in those areas would be well advised to retain the services of technical assistance contractors to compensate for this critical void.

W.D. Howard
Westlake Village, Calif.

'Software First' Approach

We agree that the software approach taken by Automatic Data Processing, Inc., Keydata Corp. and National CSS, Inc. is refreshing, as stated in *Computerworld*'s April 17 editorial. But they are far from the first companies to approach system design from a software point of view.

Prime Computer, Inc. has used a "software first" approach since it was founded in 1972. Our Primos operating system was designed before our first central processors were offered, and Prime Computer still follows that design philosophy.

We also agree that extolling the capabilities of software over the horsepower of hardware is refreshing. Again, stressing our system's functionality has been Prime's approach for some six years.

Prime Computer's success and the level of our users' satisfaction proves that "software first" works. Fortunately, as more companies — both service organizations and manufacturers — take this approach, the user wins. And that's the way it ought to be.

Gabriel A. d'Annunzio
Director,
Corporate Communications
Prime Computer, Inc.
Wellesley Hills, Mass.

Query on Abacus

With respect to K.C. Toh's article on a "hexadecimal abacus" [CW, May 1], I wonder if he could be enticed to describe the "Chinese abacus" further. I own several abaci and two books on how to use them, but they all have *four* counters below the bar and one counter above it.

As a hex buff of sorts, I always used "F" for X'15.' Is that a peculiarity of the Chinese abacus?

If so, I recommend a multiprocessing mode using two of my type of abaci. The bottom four counters of each abacus can be used to represent a "nybble," and the upper counter on each can be used for parity.

William B. Adams
Bethesda, Md

Mini Clarification

In reference to the article "Mini Proves Indispensable to Parts Distributor" [CW, April 10], I would like to point out that the original contract for implementation of Century's mini system was signed directly with Bonaventure Design & Programming Ltd.

Upon the resignation of a key member of the Minicomputer Division and the subsequent close of that division, Century then consulted with OKA Computer Systems Ltd., which completed the installation.

C. Randy Silkey
OKA Computer Systems, Ltd.
Montreal, Canada

Com-plete.
The first TP System with sales of over $1,000,000 in its first year.

Why is Com-plete an overnight success? It's CICS, IMS/DC, TSO, and more...all in one easy-to-use package.

No one else puts it all together:
- Terminal-independent mapping.
- Message switching.
- Remote job entry and retrieval.
- Interactive program development.
- Hardware storage protection.
- Data base management.
- File management.
- Multi-threading.
- Interactive utilities.
- Performance tuning.
- Interactive program debugging.
- Full user accounting through SMF.
- Security and recovery management... and more.

There's only one way to get all this in a TP System without overloading your computer and your people. It's Com-plete, the complete communications system from Software ag...and recent winner of International Computer Programs' "Million-in-One" Award.

Here's what Com-plete users say:

"Compared to all other TP Systems, Com-plete uses less core, gives faster response times, improves thru-put, and is easier to use. We replaced our on-line program development system with Com-plete and got improved interactive programming plus on-line transaction processing and more for much less overhead. Furthermore, support from Software ag is the best in the industry."

Gordon Cochrane
Manager, Information Services
R.T. French Company

"We signed a contract to design and deliver a theater and stadium seat reservation system in three months. The system will start with 50 on-line terminals and soon grow to 200. Without Com-plete, it would be impossible to meet this schedule."

Omar Alvarado, Director
Teleinformatica de Mexico

The future is here today with Com-plete. Together with Adabas, Software ag's DBMS, you can have the most powerful DB/DC System in the world, on your 360/370 or compatible computer.

To step into the future, mail the coupon or call our nearest office today.

Corporate headquarters:
Reston, Virginia (703) 860-5050.
New York (212) 682-2780.
Chicago (312) 298-4134.
Miami (305) 989-4814.
Houston (713) 444-2651.
Detroit (313) 354-0424.
San Francisco (415) 332-3890.
Los Angeles (714) 494-8410.
Cambridge, Ontario (519) 653-6142.
Mexico City (905) 550-8033.

software ag
OF NORTH AMERICA INC

Software ag of North America
Reston International Center, 11800 Sunrise Valley Drive
Reston, Virginia 22091

☐ I'd like Com-plete information.
☐ Please send information on Adabas.
☐ Let's arrange a presentation.

Name ______________ Company name ______________
Street ______________ City ______________
State ________ Zip ________ Phone ______________
Type of computer ______________ Operating system ______________
522
Worldwide support

Member SIA

Brings to Mind a Caper

Book on DP Crime Sure to Be a Best-Seller

By Joe Rigo
Special to CW

The computer industry is about to have its first best-seller in the popular book market. It is *Computer Capers* by Thomas Whiteside. It is about computer crime.

The book establishes Whiteside as the Bennett Cerf of the computer industry. He has collected every computer crime war story and anecdote from the last 15 years and he lays them out, one after the other.

The result is an essential reference source for anyone who may ever have to give an after-dinner talk about computer security.

The text originally appeared as two articles in *The New Yorker* magazine. That means it is extremely well written. It is also enormously entertaining. No knowledge of computers is required. Even a manager can understand it.

The one failing of the book is that it repeatedly portrays computer users as a bunch of patsies waiting to be ripped off by some bright-eyed technician.

This is because Whiteside is a professional journalist from outside the industry. He had to depend on interviews for his information. His sources told him a lot about the limitations of hardware and operating systems. They neglected to tell him about Tim Miller.

Tim and I used to work for one of the large New York banks. I was project manger on development of a pension payment system. Tim was the project's senior systems analyst.

Our job was to implement a system that would be similar to a payroll operation. The bank was the agent for several large companies. It sent monthly pension checks to the companies' retired employees. The whole thing involved several million dollars worth of checks each month.

Tim's main task was to design the input data edit programs and the processing controls. He had to make sure that all input transactions were valid and that all of the control totals were in proper balance before, during and after processing.

Our user representative was a Brooklyn native named Brian Ardizone. Brian was a normal Brooklyn boy. That means half of his childhood friends entered the priesthood. The other half were in the Mafia.

Reader Commentary

Together, Brian and I would try to figure out how to break through Tim's checks and balances. I knew the computer system, and Brian knew the user operation. We concocted some dandy schemes, but every one of them eventually ran into one of Tim's alarm bells.

Periodically, Jim Lawler would come by from the auditing department to check on progress. He would talk with Tim about our system's interaction with other computer systems and with the clerical staff.

Tim would make a few more scratches on his yellow pad, and another door would slam on my plans to get rich quick.

Tim wasn't being nasty. He was just doing his job. He didn't even realize I was plotting to become a chapter in Whiteside's book.

Crime and Punishment

Tim's system was not perfect, of course. There was no question that we could get our hands on some large chunks of the bank's money. The problem was in getting away with it.

At best we would have had a couple of weeks after cashing the checks before the loss would be discovered. That was somewhat better than the odds for most people who routinely handle other peoples' money as part of their daily work. All in all, though, the opportunities were not very attractive.

So eventually I gave up, admitted defeat and went back into the documentation business. Tim had triumphed again.

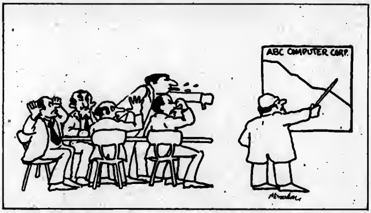
By way of postscript, I ran into Bryan on the street a few weeks ago. He had left the bank and opened two hi-fi equipment stores in lower Manhattan: one for poor people and one for rich people.

The poor people walk up one flight to a place called "The Graveyard" and shop among plain iron racks. The rich people go across the street to "Linear Sound," where they sit on plush sofas and sip coffee while salesmen scurry about.

I asked Bryan how a normal Brooklyn boy could afford to stock up on such elaborate furnishings and so much expensive equipment.

"I got a bank loan," he said.

Rigo is president of Sysdoc, Inc. in New York City.



'As Usual, Gentlemen, I Must Attribute This Quarter's Poor Results to a Total Lack of Team Effort . . .'

Meet 3 Members of
The Diskwriter Family

Available Now!
$1795.00 and up

- 10% Discount c.w.o.
- Selectable S/R Baud Rate
- Selective/Partial Transmit
- Forward/Reverse Scrolling
- Forms Handling
- Print Any/All Lines
- Text Editor

- Immediate Deliveries
- Modify Any Line of Data
- Dual EIA Ports
- Display Any/All Lines
- No Buttons or Switches
- Split Baud Rates
- Reduce Connect Time
- Lightweight & Portable
- Field Tested
- Store & Forward

- Immediate Intelligence
- 629 to 1250 Lines of Data
- 83K to 166K Storage
- Keyboard Selectable H/F Duplex
- Plug to EIA Plug Compatible
- Global Changes
- Memory Based Editor
- English Language Commands
- Keyboard Driven

Hands On Terminals, Inc.

Call or Write: JIM GIBSON, Marketing Manager
1215 SE Ivon, Portland, OR 97202 - (503)231-1057

(P.S. Meet the whole Family at the NCC, Booth #4421)

GET SMART

SHOP SMART
BUY SMART
AND SAVE $

Immediate
Shipment
From Stock

PRODUCT	TBC PRICE
DEC LA-36	$1,365.00
LS-120	2,550.00
LA-180	2,050.00
VT-52	1,395.00
ALL OPTIONS AVAILABLE	
TI 745 STD	$1,750.00
745 U/L CASE	1,840.00
745 APL	1,950.00
765 Bubble Memory	2,850.00
Teletype 43 TTL	$975.00
Pin Feed 43 EIA	1,050.00
Lear Siegler	
ADM-3A	$ 851.00
ADM-1A	1,516.00
ALL OPTIONS AVAILABLE	
Beehive B-100	895.00.
Diablo-Xerox	
1620-1	$2,650.00
1620-2	2,750.00
1620-3	2,850.00
Techtren	
815	$ 950.00
8400	1,795.00
New 950 DISK	$1,395.00
TBC 103 Modem Coupler	265.00

OTHER PRODUCTS:
300/1200 BAUD COUPLER
HIGH SPEED MODEMS
COMPLETE SUPPLIES
SPECIAL LEASING AVAILABLE
SOME USED EQUIPMENT

TBC
TERMINAL BROKERS COMPANY
37 Franklin Street
Box 312
Needham, Mass. 02192
CALL 617-449-0216

WITH IDMS RELEASE #5 WE BIT THE BULLET IN DATABASE.

IDMS NOW HAS FEATURES NO OTHER DBMS CAN MATCH IN AN ON-LINE ENVIRONMENT.

- Guaranteed recovery during concurrent processing
- Outstanding performance
- Warm restart
- Multi-threaded
- Fully re-entrant
- Useable on all IBM 370 or equivalent computers

What these features mean is that you can now support very large teleprocessing networks with very high transaction rates and know that the response times will be excellent and that IDMS (unlike other DBMS) will not permit "deadly embrace" when more than one user is updating the same record simultaneously.

No other DBMS gives the user this capability *and* performance, too. And this is true whether you use an IBM 370/115 or an MP 168. Other vendors can't do it without first rewriting the central version of their DBMS, as Cullinane Corporation has done with IDMS release #5, to make it the first of a new generation of DBMS.

We bit the bullet and did it, and now it's behind us. Our users, many of whom literally run their businesses or organizations with IDMS, need these capabilities to meet their needs for the future. In all cases they receive IDMS release #5 at no cost, and since it is fully compatible with IDMS release #4.5 there is no conversion cost.

This is why Cullinane Corporation continues to have the highest rating in vendor support among all DBMS. We support our users' needs, not just for today but for tomorrow.

Like to attend a free seminar on IDMS release #5? Use this coupon or give us a phone call. Learn more about *IDMS – the DBMS of the future.*

IDMS Seminar Schedule

Date	Location	Date	Location
MAY		JUNE	
23*	Detroit, MI	7	Detroit, MI
30*	Boston, MA	14	Chicago, IL
		20	Columbus, OH

*These are mini-seminars to be held at the Computer Caravan.

How to register

For further information and registration mail coupon or telephone (617) 237-6600.

I plan to attend your IDMS seminar.

in ______________________ on __________
City Date

Name ______________________

Company ______________ Title ______________

Address ______________________

City ______________ State ________ Zip ________

Tel. ( ) ______________ My computer is: ______________

Send confirmation to: ______________________

Cullinane Corporation

Wellesley Office Park, 20 William St., Wellesley, Mass. 02181 (617) 237-6600

Manager Recalls Gains

360/65, Packages Make Great Team

By Don Leavitt
CW Staff

MORRISTOWN, N.J. — That a product — hardware or software — is "not invented here" or not offered by IBM has often been used as an argument against its acquisition for a system based on an IBM CPU.

At the Mennen Co. here, however, quite the opposite is true. The data center has an impressive collection of items from many vendors and the outgoing manager couldn't be more pleased with the way things are working.

The company now has an IBM 360/65 and a 1403-N1 line printer, but just about everything else — except some unique applications written in-house — has been brought in from outside sources, according to Lou Orleman.

The 1M byte of main memory for the 65, for example, came from Computer Investors Group; the eight spindles of "3330-type" disk came from Itel Corp.; the tape drive subsystem from California Computer Products, Inc.; and the communications controller from Memorex Corp.

Eclectic Software

But it was in his collection of software that Orleman seemed most pleased as he summed up what he had accomplished in nearly six years as the man in charge of the center.

The operating system now, for instance, is Itel's BCM DOS/VS, and Orleman is as satisfied with it on the 360/65 as he was with Extended DOS (Edos) from The Computer Software Co. on the 360/50 he had between mid-1974 and the end of 1976.

He had six-partition support under Edos and that was fine, but with the growth in workload from Mennen and 10 outside users he needed the eight partitions he is actively using under the Itel environment.

While Orleman had Edos, he also acquired the Display Operator Console Support (Docs) package from CFS, Inc. He said his operators would be lost without this utility, which substitutes a CRT for the console typewriter, but spools most of the system messages to disk.

The need to support some 3,500 tapes led the company to Epat from SDI about four years ago, he recalled, and the cost of sorting — in space and throughput — brought on the acquisition of CA Sort from Computer Associates, Inc. in 1975.

The center has been a long-time installation of The Librarian from Applied Data Research, Inc. for its disk-based source statement maintenance chores. For a year or so, Orleman has also had Flee-Flim from Goal Systems, Inc. to speed up the link edit and library functions.

Principally to support its outside users — who have remote batch work coming into the center — Mennen acquired the Westinghouse teleprocessing monitor (Westi) two and a half years ago. Another Westinghouse product, the Disk Utilities, and the Dynam/D disk space management package from Computer Associates are also part of the company's collection of outside software, to optimize its use of the disk resources.

Orleman commented that the catalog support function of Dynam/D saved the center from several serious problems and that the package, as most of the others, was a "really good investment."

Stronger words such as "fantastic" surfaced as the manager talked about DYL-260 from Dylakor Software Systems, Inc. Acquired about three years ago, this extended report writer is used in Mennen's production environment "40 to 50 times a day" for regular scheduled work, one-time reports and utility jobs, he said.

Shop Mainly Cobol

The shop has pretty much standardized on Cobol since 1972 and now uses IBM's ANS Cobol compiler for much of its internal programming. The mainframer's RPG-II is also in use at Mennen and so is SIM14 from Dearborn, to provide an operational base for the one or two programs left over from IBM 1401 days.

Asked how he or his people went about evaluating software, the manager said in most cases the absolute need for a package's capabilities to keep the center functioning made the acquisition self-justifying. Although there are competitors for some of the products now, many were unique when Mennen went to the market, so the "choice" was easy, he said.

'Total 8' Has Query Option

CINCINNATI — Version 8 of the Total data base management system from Cincom Systems, Inc. is said to strengthen the system's performance, portability and on-line orientation. An optional query facility, T-Ask, has also been introduced to emphasize the concern for on-line work.

Total performs the functions of data base maintenance, updating, retrieval and checking for data integrity at the host language level. It includes a data definition language to provide special users with the means of building the data base and a data manipulation language through which programmers communicate with the base or bases.

Described as the "engine which will drive the Cincom software of the future," Version 8 provides full I/O overlap or multithreading, blocked logging, IBM Vsam support and extended element list processing.

MVS support and "re-architected" Environ/1, CICS and Intercomm interfaces are also part of the update, a spokesman said.

Code-directed and data-directed access to Total's data bases, additional user exits and internally accumulated statistics for tuning the system are also built into Version 8, he added.

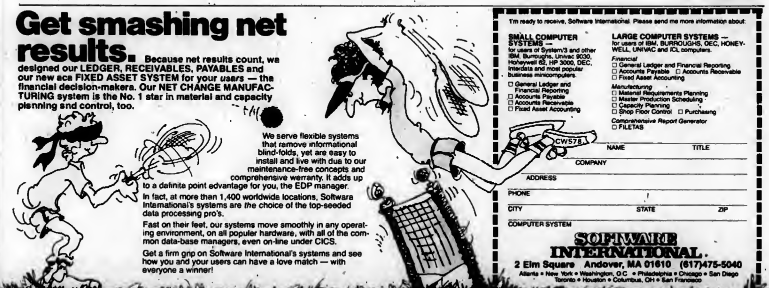
Unlike previous releases, Version 8 is a consolidated product for both IBM DOS/VS and OS/VS environments. Although there are slight variations in the code, both user communities are provided with batch and multitasking modes of operation, the spokesman asserted.

T-Ask is an on-line information processing system designed for use in conjunction with a Total data base. T-Ask's main purpose, according to Cincom, is to provide non-DP users with a facility with which they quickly and easily retrieve information about their business environment.

The subsystem has three modes of operation: maintenance, query and catalog.

Total Version 8 for DOS/VS costs $41,000 or $1,025/mo under lease; for OS/VS, it costs $52,000 or $1,300/mo. DOS/VS Task costs $19,00 or $475/mo while the OS/VS implementation costs $21,000 or $525/mo.

There is an installation charge of $2,000 for Version 8 for all existing clients, Cincom noted from 2300 Montana Ave., Cincinnati, Ohio 45211.



Get smashing net results. Because net results count, we designed our LEDGER, RECEIVABLES, PAYABLES and our new ace FIXED ASSET SYSTEM for your *users* — the financial decision-makers. Our NET CHANGE MANUFACTURING system is the No. 1 star in material and capacity planning and control, too.

We serve flexible systems that remove informational blind-folds, yet are easy to install and live with due to our maintenance-free concepts and comprehensive warranty. It adds up to a definite point advantage for you, the EDP manager.

In fact, at more than 1,400 worldwide locations, Software International's systems are *the* choice of the top-seeded data processing pro's.

Fast on their feet, our systems move smoothly in any operating environment, on all popular hardware, with all of the common data-base managers, even on-line under CICS.

Get a firm grip on Software International's systems and see how you and your users can have a love match — with everyone a winner!

I'm ready to receive, Software International. Please send me more information about:

SMALL COMPUTER SYSTEMS —
for users of System/3 and other IBM, Burroughs, Univac 9030, Honeywell 62, HP 3000, DEC, Interdata and most popular business minicomputers.

☐ General Ledger and Financial Reporting
☐ Accounts Payable
☐ Accounts Receivable
☐ Fixed Asset Accounting

LARGE COMPUTER SYSTEMS —
for users of IBM, BURROUGHS, DEC, HONEYWELL, UNIVAC and ICL computers.

Financial
☐ General Ledger and Financial Reporting
☐ Accounts Payable ☐ Accounts Receivable
☐ Fixed Asset Accounting

Manufacturing
☐ Material Requirements Planning
☐ Master Production Scheduling
☐ Capacity Planning
☐ Shop Floor Control ☐ Purchasing

Comprehensive Report Generator
☐ FILETAS

CW578

NAME TITLE
COMPANY
ADDRESS
PHONE
CITY STATE ZIP
COMPUTER SYSTEM

SOFTWARE INTERNATIONAL
2 Elm Square Andover, MA 01810 (617)475-5040
Atlanta • New York • Washington, D.C. • Philadelphia • Chicago • San Diego
Toronto • Houston • Columbus, OH • San Francisco

Course Teaches Data Base

WASHINGTON, D.C. — A three-day seminar on data base and file management systems will be held in Boston in mid-June and repeated in San Francisco and the Chicago area this summer. Sponsored by the Institute for Science and Public affairs (Ispa), "Data Base Design 78" will present basic data base concepts; and an overview of recent attempts at standards for data base management systems (DBMS).

Also set for coverage are relatively advanced data base concepts, such as search structure implementation; conversion analysis techniques; data base security; management views of corporate data bases; and case histories.

The seminar will be directed by George Schussel, vice-president of the Information Systems and Services Group of American Mutual Insurance Companies, and by Michael O'Connell, software development manager for the Business Products Group of Digital Equipment Corp.

The seminar will be held in Boston June 13-15 at the Lenox Hotel, in San Francisco June 19-21 at the Jack Tar Hotel and in the Chicago area July 24-26 at the Holiday Inn-O'Hare/Kennedy.

Registration fees, including the cost of workbooks and meeting materials, are $495 for an individual and $425 per person for groups, Ispa said from P.O. Box 31, Benjamin Franklin Station, Washington, D.C. 20044.

Users Rate CDC as Tops In Network Service Study

By Don Leavitt
CW Staff

DELRAN, N.J. — In a survey that brought nearly 700 evaluations of time-sharing and remote computing operations, the services of Control Data Corp. were rated higher in overall performance by their users than were services of competing firms.

The survey, conducted by Datapro Research Corp., showed users of all the more popular services regarded them well. CDC was at that top of the list, with a rating of 3.5 out of 4.0, but 17 other services — including all of the so-called "Big 8" — earned ratings of at least 3.0.

Even when the users were rating the services on specific capabilities, they were quite positive. Most of the detailed scores on such things as response time and uptime, especially for the Big 8, were 3.0 or better.

These ratings take on more significance in the light of several other questions Datapro's researchers asked, all of which tended to show the survey respondents were knowledgeable in both DP and the use of remote services.

According to the report of the survey in Datapro's "All About Timesharing and Remote Computing Facilities," more than half the respondents were in organizations with "extensive" in-house computing facilities.

In answer to a direct question, 65% of the users noted they had been utilizing the service being rated at least two years and better than one out of every four users had been on the particular service five years or more.

Although 32 different services received at least three sets of ratings, and therefore a place on the comparative charts Datapro included in its report, eight services were distinctly ahead of all the others in numbers of ratings received.

They each received at least 28 sets of ratings — General Electric won the "popularity poll" with 104 sets — and as a group they accounted for more than half of all the ratings. Of the Big 8, United Computing Systems ranked second at 3.4 while National Comshare CSS tied for third at 3.3.

At the top of this list of "Non-Big 8" services, ADP Network Services (once Cyphernetics) each earned 3.3 for overall performance along with On-Line Systems and University Computing Co.

The 41-page report is available for $12 per copy from Datapro, 1805 Underwood Blvd., Delran, N.J. 08075.

Package Gives Finance Reports

WOODBURY, N.Y. — A financial statements package now available form the Data Systems Division of Philips Business Systems, Inc. is said to provide users of the company's Visual I system with the software to produce profit-and-loss (P&L) statements, balance sheets and column reports (or spread sheets).

Source material for each of these reports comes from a format master file. In addition to providing the basic raw content of the reports, the file also controls the printing layout including such items as page headings, line spacing and totals descriptions.

The P&L report tracks cost centers for both current period and year-to-date, compared in terms of percentage variances with the previous year and the budget forecast.

A year-end transfer program, described as "a key module of the package," clears P&L accounts to zero and sets up new general ledger master and general ledger budgets master files for the upcoming fiscal year.

The software costs $500 and can be ordered from the Data Systems Division, Philips Business Systems, 175 Froehlich Farm Blvd., Woodbury, N.Y. 11797.

The 370/138 and 370/148. Two great computers.

At Cooper Energy Services they saved $5,000 per month.

"Since we installed our Greyhound/148 on a 12-month lease, we have saved in excess of $5,000 a month," said Jim Goughenour, Director of Communications and Information Services, Cooper Energy Services, a division of Cooper Industries, Inc. "With our short-term Greyhound lease, we have achieved optimum cost-savings and flexibility."

We lease them for less. NOW!

If you've decided to install a 370/138 or 370/148, call Greyhound. If you've already placed an order for a 370/138 or 370/148, call Greyhound. If you have one of these computers installed, be sure and call Greyhound.

If you have a need for the computer now but you have been given a late delivery date, call Greyhound. We'll deliver one of our 138's or 148's when needed and still lease it at substantial savings.

If you order between now and June 15, you can take advantage of our special 1 to 5-year True Operating Leases* that can save you a substantial amount of money every month. And no matter whether you've just decided on a 370, or have taken delivery of one, we'll work out a lease plan that will pay off handsomely on the bottom line at the end of the year.

If you've chosen a 370/138 or 370/148, you've selected one of the best computers in the world. At Greyhound, we create the best lease plans in the world. So you can have their great computer . . . at our low price. Call today.

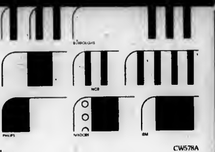
CALL: 800-528-6113

GREYHOUND COMPUTER CORPORATION

Greyhound Tower, Phoenix, Arizona 85077

**True Operating Leases — Walk-away at end of term . . . Without penalties or residual guarantees*

Free samples of Magna-Stripe cards for minicomputers and other machines



Curtis 1000 provides magnetically striped cards for minicomputers and other machines manufactured by Burroughs, NCR, Philips, Nixdorf, Monroe, Friden, Olivetti, Hermes, and Triumph-Adler.

Our *Magna-Stripe* cards are made to exacting specifications: special papers, magnetic coating bonded to the card, magnetic tape—whatever the machine manufacturer has specified. And you get Curtis 1000 quality and service! Mail postage-free card for free samples.

Curtis 1000®
business forms, envelopes, supplies

CW578A

Name
Title
Organization
Street Address
City/State/Zip

Free samples of continuous forms from a company big enough to sell you a zillion.

Or a thousand, fast.

Curtis 1000®
business forms, envelopes, supplies

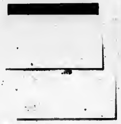
Curtis 1000 has long been big in forms. Long enough and big enough to be fourth nationally, with our parent company, among firms principally in that field. And that's enough to make us a dependable source for you! Whether you need a large quantity. Or just a thousand of our special *Quik-Tab* continuous forms—fast. Or if you need cut forms, pegboard forms, snap-apart forms, or unique combinations of envelopes and forms available only from us. Custom designed. Or imprinted—fast—from stock.

Mail postage-free card for free samples

CW578A

Name
Title
Organization
Street Address
City/State/Zip

Free samples of microfiche FILE and MAIL envelopes. Fast-inserting features save time and money. Acid-free paper protects microfiche.



Curtis 1000®
business forms, envelopes, supplies

Both our open-top and our open-side-and-top FILE envelopes have no front seams to snag microfiche being inserted, speeding operations and saving money. Both are cut low in front for easy reading of fiche identification.

Our deep-flap MAIL envelopes offer complete protection for several microfiche, either in or not in their file envelopes.

Both FILE and MAIL envelopes are made of acid-free paper with neutral gumming of flap and seams—features important in preventing chemical degradation of microfiche.

Mail postage-free card for free samples.

CW578A

Name
Title
Organization
Street Address
City State Zip

Free information on printout filing system. Tough covers in colors. Flexible posts. Simple file hangers.

Curtis 1000®
business forms, envelopes, supplies

Our *Flex-O-Post* system for printout binding and filing has tough polyethylene or pressboard covers in a full range of colors and sizes, with cover imprinting in colors. And rugged polyethylene index sheets that won't tear out.

Strong, flexible posts can be flexed repeatedly without distortion, stretching, cracking, or breaking. Tough plastic slides lock posts in sturdy metal channels.

Mail postage-free card for more information

CW578A

Name
Title
Organization
Street Address
City State Zip

Free samples of regular letterheads and envelopes on carrier sheets. They make personalized mailings look, and pull, like correspondence.

Curtis 1000®
business forms, envelopes, supplies

The basic marketing appeal of a personalized mailing is the computer's ability to insert words that make the message read like personal correspondence.

To make the most of that appeal, your mailing must look like correspondence too. So we offer your regular letterheads and envelopes mounted on carrier sheets—not substitute stationery that looks like continuous forms.

Our *Chain-O-Letter*® continuous letterheads and *Envo-Matic*® continuous envelopes give you nice cut edges, any paper you want, and your choice of most modern printing techniques.

Mail postage-free card for free samples.

CW578A

Name
Title
Organization
Street Address
City/State/Zip

FIRST CLASS
Permit No 1000
Smyrna Georgia

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid By—

Curtis 1000
1000 Curtis Drive
Smyrna Georgia 30080

FIRST CLASS
Permit No 1000
Smyrna Georgia

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid By—

Curtis 1000
1000 Curtis Drive
Smyrna Georgia 30080

FIRST CLASS
Permit No 1000
Smyrna Georgia

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid By—

Curtis 1000
1000 Curtis Drive
Smyrna Georgia 30080

FIRST CLASS
Permit No 1000
Smyrna Georgia

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid By—

Curtis 1000
1000 Curtis Drive
Smyrna Georgia 30080

FIRST CLASS
Permit No 1000
Smyrna Georgia

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid By—

Curtis 1000
1000 Curtis Drive
Smyrna Georgia 30080

'Management IV' Supports Human Resource Reporting

CANOGA PARK, Calif. — The Management IV/Human Resources System introduced recently by Informatics is said to simplify complying with and reporting on the host of government regulations pertaining to employment practices.

The package fully satisfies all government regulations regarding both data collection and reporting for Equal Employment Opportunity (EEO), the Occupational Safety and Health Administration (OSHA), the Employee Retirement Income Security Act (Erisa) and Affirmative Action programs, a spokesman claimed.

Within a user's organization, Management IV will provide personnel managers with all relevant information regarding individual employees, groups of employees, overall company employment profiles and skills inventory operations, he continued.

The package is said to encompass all standard personnel functions such as salary administration and attendance history, and to provide for regular communications with employees.

Derived from Informatics' Mark IV file management system, the retrieval mechanism of Management IV allows managers to produce analyses and complex reports. These could be developed for one-time needs or for regular production processing because the procedures can be stored for reuse.

Modular in design so users can build the system to meet their needs, the complete Management IV/Human Resource package is available for $30,000 from Informatics at 21050 Vanowen St., Canoga Park, Calif. 91304.

'Mars' Helps Townships

KING OF PRUSSIA, Pa. — Written in Basic for use on a range of minicomputers, the on-line Municipal Accounting and Reporting System (Mars) from Quad Data Associates, Inc. (QDA) includes general ledger, tax collection, accounts payable, budget, payroll and water or sewer service billing modules.

The package was developed in such a way that it can support single or multiple townships, he said, adding that use of data base management logic permits efficient use of storage through elimination of redundant data; a built-in report generator eases the system's interfacing with non-DP personnel.

Mars contains three levels of security — modular, functional and data. Control is established through access codes, passwords and on-line editing, QDA said.

The vendor is ready to support Mars installations on Digital Equipment Corp. or Data General Corp. minis, including DG units operating under a Micos environment from Mini-Computer Systems, and plans to support others later.

The entire Mars package is available for $16,500, but the ledger module can be acquired for $5,000; the payroll logic for $4,000; tax collections, $3,500; accounts payable and budget, $3,000; and the water or sewer billing for $2,000.

QDA is at Suite 116, 1000 Valley Forge Circle, King of Prussia, Pa. 19406.

Pascal Ready For DG Users

COLUMBIA, Md. — Users interested in working with the Pascal language now have another compiler to consider. Developed and marketed by Rhintek, Inc., this one runs on the Data General Corp. family of minicomputers under RDOS. The compiler will compile itself in a mapped Nova or Eclipse or an unmapped Nova with 32K bytes of memory, according to a spokesman.

The language is said to incorporate the best features of several languages, including the data structuring capabilities of Cobol, the block structured organization of Algol and the compact arithmetic expression of PL/I.

"Growth in Use of Pascal Called Revolutionary" [CW, April 24] took note of the broad interest in the language; Oregon Minicomputer Software, Inc.'s Digital compiler for the Digital Equipment Corp. PDP-11 [CW, May 15] seemed to confirm the movement.

Rhintek's compiler for the DG minis comes with source code, binary code and demonstration programs. It costs $975 and is available through P.O. Box 220, Columbia, Md. 21045.

'Supertab' Models Built on DEC Mini

CINCINNATI — Supertab 2.0 from Structural Dynamics Research Corp. (SDRC) is an interactive finite element modeling system designed to run on Digital Equipment Corp. PDP-11/34s under either RT-11 or RSX-11.

Supertab provides the capability to create, display and edit finite element models using a Tektronix, Inc. 4010 series CRT terminal and Tektronix digitizing graphic tablet. It works with both two-and three-dimensional models, he added.

A single-user system requires a 64K PDP-11/34A under RT-11 with appropriate peripherals; a multiuser system would need a 256K PDP-11/34A. Both also require Fortran support.

Supertab 2.0 costs $20,000 or $1,000/mo for a minimum three months, SDRC said from 5729 Dragon Way, Cincinnati, Ohio 45227.

Now Computerworld can take you down under

As of July, the world will have a new *Computerworld*. *Australasian Computerworld* will become the newsweekly for the computer communities of Australia, New Zealand, New Guinea, Phillipines, Thailand, Indonesia, Singapore and other Pacific Ocean countries.

Taken together, these countries comprise a large and growing EDP market, ranking approximately 9th in the world in value of general purpose computer systems, according to figures from International Data Corporation — the world's leading EDP market research firm And they are major importers of US-made computer products Australia alone, according to US Commerce Department figures, will be spending over $400 million on US computer equipment by 1980

As our wholly owned sister publication, *Australasian Computerworld* will maintain the same format and excellent editorial content that has made *Computerworld* so successful in America And it will be read by the key EDP buying influences throughout its area

We invite you to become a charter advertiser in *Australasian Computerworld*, and we'll be glad to give you more details Just give us a call or send in the coupon And don't forget our other international sister publications We'll be happy to give you information on any of them, as well. Here's the list of all our computer publications

COUNTRY	WORLD RANK (by value of computers)	PUBLICATION[S]
U S	1	*Computerworld*
JAPAN	2	*Shukan Computer*
GERMANY	3	*Computerwoche*
UNITED KINGDOM	4	*Computer Management*
FRANCE	5	*Zero-Un Informatique*
ITALY	8	*EDP Notizie* *Sistemi E Automazione*
AUSTRALIA	9	*Australasian Computerworld*
BRAZIL	17	*Data News*

CW COMMUNICATIONS/INC.

Terry Williams, Advertising Administrator
COMPUTERWORLD
797 Washington Street, Newton, MA • (617) 965-5800

Please send me more information, as checked:

☐ International Market Brief

Rate Cards for:

☐ Computerworld ☐ Shukan Computer
☐ Computerwoche ☐ Computer Management
☐ Zero-Un Informatique ☐ EDP Notizie
☐ Sistemi E Automazione ☐ Data News
☐ Australasian Computerworld

Name ______
Title ______
Company ______
Address ______
City ______ State ______ Zip ______

'Systemacs' Enforces Development Standards

VALLEY FORGE, Pa. — "More than a manual," the Systemacs package provides a logical series of software development tools that enforce standards across the board — for user, analyst, programmer and operator, according to its vendor, Management and Computer Services, Inc. (Macs).

The software support package provides a structured methodology for the implementation of complete information systems through the full software life cycle, a spokesman said, noting that requirements, analysis, specifications, programming and maintenance efforts are all supported.

Systemacs is made up of three "phases" that can be acquired and used separately. In the systems analysis phase, it provides a manual approach to interviewing, specifications, economic evaluation and scheduling.

The foundation of the system development effort is a "Statement of Requirements," a written understanding with the user of what is wanted and what will be provided.

A prototype report generator program is provided as part of Systemacs to prepare sample report pages for the statement, he added.

The package's job specification phase supports development at a logical job level, rather than encompassing an entire system of focusing in too closely on a single program. The specifications provided are said to be accurate, complete and unambiguous, easy to change and organized in such a way that each report value, for example, can be traced back to its source.

As the third phase, Systemacs' Standard Program provides an application-independent logical framework that can be copied from the installation's source statement library and then completed with user-written logic developed on specialized coding forms.

The entire package, with software that runs on IBM 360 and 370 hardware and manual support that has no equipment limitation, costs $30,000, Macs said from 790 Valley Forge Plaza, Valley Forge, Pa. 19482.

Look Into Johnson Systems'

CICS/VS
UTILIZATION MONITOR AND
CHARGEBACK SYSTEM

"Now, a powerful data collection system that lets you accurately account for . . . and equitably bill for . . . all resources used by each user."

"The first feasible alternative to Performance Analyzer."

Send me your brochure about the new CICS/VS UTILIZATION MONITOR and CHARGEBACK SYSTEM.

Name ____________
Title ____________
Company ____________
Address ____________
City ____________ State ____________
Zip ____________ Phone (______) ____________
Computer ____________ Operating System ____________

C522

Johnson Systems, Inc.
8400 Westpark Drive
McLean, Virginia 22101
(703) 893-8700

IRS, SEC Reports Produced

ANDOVER, Mass. — Described as complete enough to satisfy the latest Internal Revenue Service (IRS) and Securities and Exchange Commission (SEC) reporting regulations, a fixed asset accounting system is now available from Software International.

In addition to meeting the reporting requirements, the package is said to provide audit trails reflecting all asset dollar activity and physical movement. Support for multiple-company processing enables each entity to set its own procedures, processing cycles, fiscal year and organizational structure, a spokesman said.

Parameter-driven report options allow each user organization to vary the content of system output without program modification. Reports can be created from more than 35 master file fields, with summarization on up to seven totals on any report, he continued.

The system includes an Asset Depreciation Range (ADR) module to simplify tax accounting under the SEC's rules. Asset additions and retirements for both corporate and tax books can be entered with a single input transaction, he said, adding that a single code is provided for defining the depreciation controls on both books, to minimize input even further.

ADR assets are grouped, while individual asset detail is retained for corporate accounting. ADR reports produce information required on IRS Form 4832 covering additions, depreciation, repair allowance and retirements, the spokesman asserted.

The modular software functions under IBM DOS or OS environments.

The package costs $19,500 for DOS installations or $21,500 for OS sites. The vendor is at Elm Square, Andover, Mass. 01810.

Bidding Eased For Builders

ALEXANDRIA, Va. — A Construction Estimate and Bid (CEB) system developed by Technical Construction, Inc. here is now available as an Installed User Program (IUP) from IBM's General Systems Division for use on its System/32 minicomputer.

CEB is said to accept dimensions of components taken from bid specifications and plans; calculate the quantity and type of materials needed and their cost; allow a human estimator to alter the set prices and add data about intangibles, desired markup and performance bond costs; and present all the accumulated information in a form of a proposed bid.

The system supports 26 predefined formulas for the calculation of various links, areas, volumes and quantities; the formulas are applicable to both rectilinear and circular structures.

Once a bid is accepted, CEB produces a file that can be used as input to IBM's Construction Management and Accounting System (CMAS) to provide data for project control when building actually starts, the spokesman noted.

Written in RPG II, the IUP — which has no long-term support from IBM — costs $150/mo for 12 months.

Managers Meet Planned in L.A.

CHICAGO — A three-day seminar on "Project Management for Computer Systems" will be presented in Los Angeles late this week under the sponsorship of the University of Chicago.

The Califotnia session will be held Wednesday to Friday, May 17-19. Taught by Michael H. Marcus, president of C.I.S. Systems, Inc., the course will also be given in Houston, Texas, in early August and in New York late in October, according to the university.

The concepts and skills detailed in the seminar will be illustrated by specific examples and case studies. A variety of teaching methods, including a workbook, will be utilized to make points during the presentation and to serve as reference material later, a spokesman said.

Registration fee is $495 per person plus $65 per company. More information is available from the Registrar's Office, P.O. Box 2409, Grand Central Station, New York, N.Y. 10017.

Logic Extended In $75 'Mailout'

PORTLAND, Ore. — The Mailout mailing list processor software from the Center for the Study of the Future now sorts on Zip Code or address/title. It also merges or extracts subfiles based on codes stored with the address, a spokesman noted.

Written in commercial or Microsoft Basic and supplied on CP/M-type diskettes, the package also prints labels or envelopes in one or more columns and processes letters against mailing lists.

The software costs $75 from the center at 4110 N.E. Alameda, Portland Ore. 97212.

International Securities Shown on Net's Data Base

WALTHAM, Mass. — An international securities data base said to cover more than 14,000 securities in 22 countries is now available through the remote computing service of Interactive Data Corp.

Known in North America as Exshare, the data base is compiled by Extel Computing Ltd. of London and by Reuters Ltd.

Exshare provides daily updates on 67 data items for more than 5,000 securities quoted in the UK and 9,000 securities quoted in continental Europe, Asia, South America and Africa, spokesman said, noting this is the firm's second offering of its type.

Last year the firm introduced an overseas financial data base called Exstat, which features data on more than 2,000 foreign companies.

"Together, Exshare and Exstat provide powerful analytical tools for diversifying investments, evaluating potential mergers and acquisitions outside the U.S. and investigating credit worthiness," he claimed.

Exshare covers equities, fixed-dividend capital securities, preferential capital, loan stocks, debentures, unit trusts, insurance and property bonds, Eurobonds, offshore and overseas funds, government stocks and convertible debentures.

It also contains certain indices of stock traded in the UK.

The data items provided by Exshare are said to include daily prices, splits and dividends, interest payments and schedules, capitalization, earnings, fiscal year-end dates and redemption features. Users can access securities prices for the currency in which they are traded or in terms of U.S. dollars or pounds sterling, the spokesman noted.

Historial information extends back to Sept. 1, 1972 for UK securities and to Jan. 3, 1977 for all others, he said, adding most of the data is adjusted for capitalization changes to permit consistent analysis of historial security prices on the major world markets.

Interactive Data is at 486 Token Pond Road, Waltham, Mass. 02154.

Net Extends 'Fiscal' Usage

FAIRFIELD, N.J. — Available as a package for use on Digital Equipment Corp. Decsystem-10s or 20s or as a service on the Rapidata remote computing network, the latest release of Fiscal is said to be a complete redesign of the financial modeling software.

Fiscal is intended to be a totally integrated system for organizing, manipulating, analyzing and reporting financial information.

The flexibility of the system provides both the experienced and the naive computer user with the opportunity to prodce timely and correct solutions to their business requirements. Fiscal will handle a broader range of analytic financial applications than any other financial language, Rapidata claimed.

Typical Fiscal applications are said to include five-year forecasts, one-year operating plans, corporate models and support for budget preparation. Performance analysis, capital budgeting, capital investment analysis and financial consolidations are also handled with the system, the spokesman noted.

With this release of Fiscal, all of Rapidata's major products — Probe for time series analysis and X2C for data base management and reporting, as well as Fiscal — now have a common integrated data base access.

Fiscal is accessible on the Rapidten time-sharing service at Rapidata's standard rates and is also available under license for in-house installation at costs ranging from $20,000 to $100,000 depending on the amount of custom work and support required, Rapidata said from 20 New Dutch Lane, Fairfield, N.J. 07006.

'TPG' Eases System/3 Work

BAYSHORE, N.Y. — The Telecommunication Program Generator (TPG) package from Granat Data Corp. is said to generate error-free Display Function Facility (DFF) and RPG-II source programs for the IBM System/3 user working with IBM's Communications Control Program. (CCP).

Input to TPG is coded on standard RPG-II file description and input specifications sheets. The generated code should enable any user to inquire into, update or update and add records to any indexed master file, a spokesman said.

The package also supports field protection and 15-position field descriptions. New line options, numeric field editing and user-designated program names are also provided through TPG, he added.

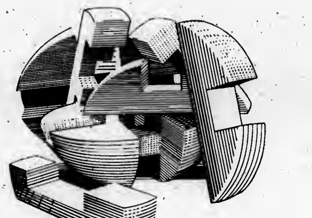
The Granat package alerts the terminal operator as to what function is taking place during each generated program's execution.

TPG also generates the code needed to create an audit file for each master file maintained by the system.

Standard DFF terminal keying conventions apply to the programs created by TPG, the spokesman noted.

TPG is written in RPG-II, runs in batch mode on all properly configured System/3s, requires 20K to 25K bytes (without overlays) and costs $300. Granat is at 1456 Peters Blvd., Bayshore, N.Y. 11708.

Puzzled by Database?



Free DBMS Seminar for Problem Solvers. Don't miss it!

If you're a manager, senior DP person or user who needs to put the database puzzle together, you shouldn't miss our free one-day seminar.

It's all about INQUIRE®, the Problem-Solver's DBMS from Infodata Systems.

We'll show you how easily INQUIRE can put all the pieces—data management; on-line processing; built-in flexible reporting; a true user's language; even full text retrieval—together into one unpuzzling package!*

*INQUIRE operates in IBM 360/370 (OS. VS. CMS) plus Amdahl and Itel environments.

INQUIRE DBMS SEMINAR SCHEDULE

Chicago . . . . June 15, 1978

Kansas City . . . . . . June 21, 1978

Reserve now—space is limited. Fill out the coupon and mail immediately, or call us at (703) 578-3430.

Infodata
Infodata Systems Inc.
5205 Leesburg Pike
Falls Church, Virginia 22041

Please register me for the free INQUIRE seminar in:

☐ Kansas City ☐ Chicago

Name

Title

Company

Street Address

City

State Zip

Telephone

Sorry, I can't attend any of the seminars planned, but I'd be interested in:

☐ Boston ☐ Dallas
☐ Philadelphia ☐ St. Louis
☐ San Francisco ☐ Washington, D.C.

® COPYRIGHT 1978 • INQUIRE REGISTERED U.S. PATENT OFFICE TO INFODATA SYSTEMS INC., ROCHESTER, NEW YORK, U.S.A. COVERED BY U.S. PATENT NUMBER 3670310

THREE NEW DIGITAL DISKS MEAN 30 NEW DIGITAL SYSTEMS.

Last month we introduced three new, improved Digital disk subsystems—the 28MB RK07, 5MB RL01, and the 67MB RM02. New capacity, state-of-the-art data integrity features, and prices lower than any in Digital's history. What's next? Thirty new, improved Digital computer packages.

Each system has been configured to take full advantage of the increased disk capacity and each one offers total system performance at prices never offered before.

Here are just three good examples. Remember, there are 27 more where these came from.

EXAMPLE #1: A BIGGER VAX SYSTEM AT THE SAME PRICE.

The 32-bit VAX-11/780 teams up with our new RK07 disk subsystem to give you twice the disk capacity. Fifty-six million bytes of on-line disk storage. Plus twice the memory: 256K bytes of error correcting MOS memory. And with it comes Digital's fully supported VAX/VMS software, fast floating point arithmetic, and all the other great VAX performance features.

One thing hasn't changed though. The low VAX price.

EXAMPLE #2: A NEW DATASYSTEM.

Now you can get a Datasystem 325 package with the new 10 megabyte RL01 disk subsystem. Bigger and faster — and what's more, it's less expensive. That's right. Datasystem 325 featuring Digital's LSI-11 central processor, 64K bytes of main memory, and the VT52-N terminal is now the biggest bargain ever.

EXAMPLE #3: A NEW REAL-TIME SYSTEM.

The powerful PDP-11/60 combines with the new 134 megabyte dual RM02 disk subsystem and becomes a real-time powerhouse.

The PDP-11/60 package includes Digital's fully supported RSX-11M software, the powerful PDP-11/60 central processor, 128K bytes of error correcting MOS memory, and more. Add the new disks and you get an enormous amount of performance for the price.

THERE'S MORE.

Now that you know about just three of the ways Digital's new disks are setting good examples, find out about the other 27. Send the coupon today. Digital Equipment Corporation, 146 Main Street, Maynard, MA 01754. European headquarters: 12, av. des Morgines, 1213 Petit-Lancy/Geneva. In Canada: Digital Equipment of Canada, Ltd.

digital

Digital Equipment Corporation, 146 Main Street, Maynard, MA 01754. Attention: Communication Services (NR-2/2)

☐ Please send complete details on your new disk based systems.
☐ Please send your new disk brochure.
☐ Please have a sales representative call.

Name______________________________
Title______________________________
Company____________________________
Address____________________________
City________________State________Zip________

CW5228

Picking an RJE Vendor — Part 1

Services Different From Network to Network

By Richard J. Poje
Special to CW

Many organizations today use commercial remote batch processing services to supplement their in-house DP, and some have replaced their computers entirely with these services.

Flexibility, ease of use, rapid turnaround and cost reductions are the most frequently cited reasons for purchasing remote batch services, but there are almost as many justifications as there are users, and user satisfaction — the degree to which expectations have been met — varies considerably from customer to customer and from vendor to vendor.

DP managers looking to purchase remote batch services for the first time or to replace an unsatisfactory vendor will considerably improve their chances of future satisfaction if they clearly define their requirements beforehand and follow some common-sense guidelines in evaluating potential vendors.

Remote batch processing — or remote job entry (RJE) — is often considered a commodity service, indistinguishable from vendor to vendor save for pricing. Vendor selection is, therefore, often based on cost alone or, at best, on some combination of factors with cost predominating.

This is not to say the cost of RJE is unimportant. Quite the contrary, since the containment of burgeoning DP budgets is one of the remote computing industry's strongest selling points.

What is more significant, however, is that RJE is far from being a commodity; it is a service that varies substantially from vendor to vendor and one that must be carefully evalutaed in terms of each potential customer's individual requirements.

When the widget factory down the block decides to absorb excess computer time with RJE sales — an increasingly common phenomenon — its prices may be 30% to 40% below prevailing market rates. A bargain — until the factory shuts down for its two-week summer vacation and forgets to notify you.

Likewise, a customer using one of the large national services to ease itself through an in-house peak load situation may find it is paying needlessly for the vendor's investment in hardware, software and telecommunications. In short, cost is only one of many factors to be weighed and evaluated in selecting an RJE vendor.

Reporting and Control

Loss of control at any one of several levels is a serious concern, especially to new RJE users, and potential vendors' control systems should be scrutinized carefully. Administrative control systems are particularly important, since in most cases user management is physically isolated from DP operations and is unable to directly control the use of RJE resources.

In such an environment, management must rely on the RJE vendor to produce timely reports of resource usage and billings.

Data should be broken down on a project-by-project basis; it should clearly identify where resources are being used within a project or system and, where appropriate, by whom. This latter consideration become critical when RJE is used for systems development, since many programmers may be working on a single project or project component and submitting jobs at RJE workstations.

The availability and quality of administrative control systems is a key indicator of the vendor's commitment to the remote computing services business. They are expensive to develop and therefore are not frequently found among the marginal vendors.

On the other hand, vendors who have made the investment tend to enjoy much higher levels of customer satisfaction, and customers themselves have come to rely on administrative control systems both for budget management and as a measure of DP productivity.

Physical, Data Security

Physical security and data security are also extremely important control-oriented issues. If at all possible, the customer should visit a potential vendor's facility and get a first-hand picture of the physical security systems in force.

Most vendors will be happy to provide a guided tour and will be eager to describe the systems and procedures they have implemented to protect themsleves and their customers from environmental problems, fire, theft and malicious mischief.

Vendors who do not limit access to their computer facilities should be immediately suspect, as should those who lack formal backup/recovery procdures and disaster planning or who have not adequately protected themselves via alarm systems and offsite data storage against fire, theft and other similar problems.

Data security is somewhat more difficult to evaluate, but no less critical than physical security. As a general rule, computer manufacturers have done less than an adequate job — until very recently at least — of incorporating data security features into their hardware and operating system software.

Many RJE vendors rely solely on the manufacturers' data security and, as a result, can offer their customers little real protection, regardless of their claims.

Other vendors, including the major national suppliers and a number of high-quality regional houses, have either made extensive modifications to the manufacturers' data security features or have scrapped them entirely and developed their own. The most advanced systems employ hierarchial password protection integrated with the administrative control system, and many use some form of encoding or encryption to further frustrate attempts at unauthorized access.

Data security systems should also protect against accidental loss or damage, since head crashes, tape drive problems and transmission errors are far more likely to occur than are thievery and mischief. Permanently mounted on-line storage media such as IBM 3350s have gained broad and rapid market acceptance because of their impressive price/performance ratios, but they have also created some problems along the way.

When used in an RJE environment, their contents must be frequently dumped to an off-line medium such as tape, a costly and time-consuming process some vendors have labeled a "user responsibility."

In general, the more sophisticated vendors will assume this responsibility themselves and will have formal systems and procedures for restoring all forms of damaged data, regardless of the cause or damage, within a very short time — an hour or less — and with minimal loss of information.

There are more aspects of a vendor's operation the potential user should evaluate before making a decision. In his next article, Poje — president of Chicago-based Phoenix-Hecht, Inc. — will suggest how to examine a vendor's performance track record, support services and applications software libraries.

Micropolis Disk Systems Gain Isam File Support

VAN NUYS, Calif. — Supporting indexed sequential access method files on Micropolis floppy disk subsystems, the Magsam package enables users to create and access records through user-defined keys, according to the vendor, Micro Applications Group (MAG).

With the facility, records can be retrieved randomly by key, sequentially by key, sequentially in physical (chronological) order or randomly by relative record number. Records can be created randomly or sequentially by key, a spokesman added.

Because Magsam records are stored in standard Micropolis format, files are compatible with all Micropolis Basic features, including dynamic file allocation, and any independent vendor software, he claimed.

Magsam is distributed on a minifloppy in source format and costs $75 for a single site. Dealer and OEM arrangements are also avialble, MAG said from 7300 Caldus Ave., Van Nuys, Calif. 91406.

OMSI PASCAL™-1
for LSI-11 through PDP-11/70 $1500

Available now for RSX-11, RSTS/E, and RT-11
Compiles standard PASCAL to fast machine code
Includes high level symbolic debugger
Real time, process control extensions
Over 50 installations

Call (503) 226-7760 for a free demonstration

Oregon minicomputer Software inc.
2340 SW Canyon Road
Portland, Oregon 97201

1 DOS/VS + Q*SHARE 1 DOS/VS = 3

If you have a single DOS/VS system, add another, smaller system linked with Q*SHARE...and you will achieve TRIPLE THRUPUT with TOTAL FLEXIBILITY.

Q*SHARE makes in unnecessary for multiple CPU installations to have dedicated unit record devices - reader, punch, printer, etc - for each memory resident copy of POWER/VS The same CPU can control all unit record input and output devices

Q*SHARE equalizes I/O device usage as POWER/VS queues and data files are shared For example, the print output is dynamically routed to the first available printer regardless of its apparent "parent CPU"

Other benefits of Q*SHARE

- Much greater flexibility in scheduling - shared spooling capabilities create an "automatic switching" system
- Greatly improved thruput performance as a result of the "automatic switch"
- Reduced equipment costs -eliminate or exchange devices; have Q*SHARE improve their utilization
- Install in only a few minutes

Send for complete information on Q*SHARE SHARING OF POWER/VS QUEUES BETWEEN CPU'S

LABYRINTH SYSTEMS, LTD.
17 Barstow Road
Great Neck, N.Y. 11022
(516) 487-7766

Bank Credits Terminal Net With Improving Service

GARY, Ind. — Better customer service, more efficient operations and increased bank protection are being achieved with a terminal network system recently installed in the main and branch offices of Gary National Bank, here, according to Paul Kloth, vice-president of operations and cashier.

Operating with total resources of about $500 million, the banker operates 20 branch offices. With its retail orientation, Gary National serves a large number of accounts, including 55,000 checking, 56,500 regular savings, 13,000 time deposit, 8,000 savings certificate and 13,000 Christmas Club accounts, Kloth noted.

As a result, the bank handles a high volume of customer inquiries — about 110,000 a month. Forty thousand of these are direct phone inquiries, while the remainder are received by tellers in main and branch offices.

Previously, all of these inquiries were handled by central accounting personnel who used local communications terminals to contact the bank's computerized central information file. Customer phone inquiries were handled directly by the central accounting personnel; inquiries made at main or branch offices were phoned in by tellers.

With about 300 tellers in Gary National Bank's main and branch offices processing as many as 50 different transactions each, there was a real need for a time-saving tool.

Loren O. Ogborn, vice-president and manager of DP, directed installation of a terminal network system consisting of three IBM 3604 Model 3 terminals for the DP area of the main branch and 30 IBM 3604 Model 2s; 50 IBM 3606 terminals are in the process of being installed.

Each branch office will have one 3604 Model 2 and one to 10 Model 3606s for teller transactions. Branch offices are from two to 18 miles away.

The Model 2s have replaced 30 Model 1s which were "limited on inquiry because they had no alphabetic keyboard," according to Nolan Dennington, supervisor of systems and programming.

Branch terminals transmit at 300- and 1,200 bit/sec, with the majority of main branch functions running at a speed of 300 bit/sec.

Utilizing IBM's Extended Telecommunications Access Method in conjunction with the Network Control Program (NCP), the terminals operate on-line with IBM's Customer Information Control System (CICS) on the bank's IBM 370/135. The system has a 3704 front-end processor.

IBM finance terminals are used in accounting department.

To process an inquiry, tellers enter their identification number and the customer account numbers in a terminal. For a checking account, the following data is displayed on the terminal screen: customer name, available balance, current balance, last deposit date, number of uncovered checks in a period and any stop payments.

If a customer wishes to cash a check, data shown on the screen is reviewed to ensure there are sufficient funds in the account, following which a "hold" for the check amount is entered. Stop payments are also entered in terminals at customer request.

The same basic data is displayed for savings accounts while "holds" are entered for withdrawals. For loan accounts, portfolio data is displayed on terminal screens, and for safe deposit accounts, customer names and addresses are shown.

"The terminal network system has unlimited capabilities for expansion in the future and we are currently experimenting with various other data entry and capture applications," Kloth said. "Overall, the terminal network system provides Gary National Bank with the capability of improving customer service while keeping costs down."

Datapac to Back 3270-Type CRTs

OTTAWA — A service designed to support IBM 3270-compatible CRT terminals on Datapac, the coast-to-coast Canadian packet-switched network, has been announced by The Computer Communications Group (CCG) of the TransCanada Telephone System.

The service, called Datapac 3303, will provide the first Datapac support for synchronous terminals, a spokesman noted. Rates for the service will be announced this summer; commercial service is expected by the end of 1978, he added.

Datapac 3033 will enable IBM 3270 terminals and emulators such as CCG's Vucom 2 terminal operating under the Binary Synchronous Communications (BSC) Line protocol to communicate with host computers via the Datapac network.

The Datapac 3303 services will be based on the Network Interface Machine (NIM) using Northern Telecom SL-10 line processors. These processors will poll the 3270 controllers on an on-line basis over multipoint facilities utilizing the standard 3270 BSC line protocol. At the other end, host computers will access the network via Datapac 3000 (Snap) service. A Datapac Modified Emulation Program software package from Cambridge Telecommunications of Bedford, Mass., will be available for host support.

CCG is at 160 Elgin St., Ottawa, Ont. K1G 3J4, Canada.

Paradyne Gives 360, 370 Users Entry-Level Communications

LARGO, Fla. — Paradyne Corp. has introduced a remote I/O system for first-time data communications users. The Low-Cost PIX (LCP) allows the IBM 360 and 370 users to implement an entry-level telecommunications system that can support both CPU-to-CPU links and remote I/O operations at low cost, according to a spokesman.

The LCP is a means of extending the multiplexer channel interface of an IBM 360 or 370 mainframe to remote locations without mainframe-resident communications software such as Btam, Qtam or RJE, he explained. LCP essentially replaces the modems, communications controllers and synchronous line adapters normally required to support telecommunications applications.

The LCP consists of a control unit attached to the byte multiplexer channel of the mainframe, either half-duplex or full-duplex line modules which allow CPU-to-CPU links and remote control units that can support Paradyne and/or IBM card readers, reader/punches and line printers at speeds of 250 to 1,100 card/min or line/min.

The system can utilize either digital network links or voice-grade lines and can support data transfer rates from 4,800- to 19.2 kbit/sec, depending upon the system and telecommunications line configuration, Paradyne said.

Prices for the LCP begin at $465/mo. on a five-year lease. Purchase is $19,900 and maintenance is $380/mo.

Paradyne is at 8550 Ulmerton Road, Largo, Fla. 33541.

DEC CALL TODAY * USE IT TOMORROW!

ADD LIFE TO YOUR PDP11 WITH LOW COST
11-SERIES MEMORY

MM11L	8K Memory (11/05-11/10)	$ 750
MMR11E	4K Memory (Rugged 11/20)	750
MM11K	4K Memory (11-Series)	150
MF11UP	16K Memory & Backplane (11-Series)	2300
MM11UP	16K Memory (MF11UP)	1700
MF11UR	32K Memory (Parity)	4000

VT50 HA DECSCOPE ONLY $995

SEND FOR NEW FREE DEC PRICE LIST
DEPT CWS

"NEW" DECWRITER II & III
LA36 ... $1495 — LS120 .... $2695

AMERICAN USED COMPUTER P.O. BOX 68, KENMORE STA. BOSTON, MASS. 02215 617-261-1100

In-House Terminal Speeds Client Payments

MIAMI — A computer terminal system designed to speed customer payment processing is helping Jordan Marsh/Florida improve its cash flow while reducing the cost of handling charge account remittances.

The Miami-based division of Allied Stores Corp. has installed an IBM 3762 payment transaction processor to handle payment processing, which formerly had been handled by a local bank on a service basis.

The 3762, which is said to process up to 1,400 bills an hour, has substantially reduced the cost of payment processing, according to Gardner Wright, assistant controller of Jordan Marsh/Florida.

"By using our own in-house processing facilities," he said, "we now have complete control of incoming funds, and we can reduce our compensating balance in the bank."

The 3762 has turned what used to be a multistep process into an efficient one-step operation, Wright claimed.

Previously, payment checks received by the bank were encoded and endorsed and the accompanying payment stubs sent to Jordan Marsh, then totaled and transmitted to a computer in New England, where Allied Stores Corp. maintains customer records for many of its divisions.

Processing Operation

Now, to process a payment, the operator inserts the bill stub into the terminal, which optically scans the document's preprinted information, Wright explained. As this information is scanned and edited, the operator keys in the check amount and inserts the check into the terminal, which automatically reconciles bill and check data and encodes the check with magnetic ink characters for later processing at a bank.

If the bill and check amounts do not match, the terminal's keyboard automatically locks and a signal light appears. The operator must take appropriate action before the transaction can continue, Wright noted.

The terminal then endorses the checks, prints audit trail data on both documents, sends them to separate stackers and prints a journal tape. Deposit slips are printed and added to groups of checks as they are separated for deposit.

Transaction records are placed on a disk file in the system's IBM 3791 controller, then transferred to an IBM 370/138 and, finally, along with financial and other management data, are transmitted to the New England data center at the close of the business day.

"We process an average of 6,000 statements a day, and we can do in five days work that required six days for the bank to do," Wright said. "When necessary, we've handled as many as 12,000 in a day, and the 3762 has the capacity to take care of increased seasonal volumes."

The 3762 also offers the potential to improve customer service, Wright said.

"The 3762 allows us to respond to a customer's complaint quickly, by means of audit trail information — account number, the date the payment was processed and the amount remitted, for example — that was printed on the back of the check when we processed it." If the check was misplaced or accidentally destroyed, the customer's bank, which had microfilmed both sides of the check, can furnish audit trail information, he said.

"We feel we now have the ability to solve customer problems more quickly because we have the means to better identify the problem," Wright said.

The 3762, which can also be used as a data entry device, is used by Jordan Marsh to handle both mail payments as well as those received over the counter.

Bell 103, 202 Gain 27 Modems From Novation

TARZANA, Calif. — Novation, Inc. has introduced its 4000 series of 27 integrated acoustic and direct Bell-103- and 202-compatible modems.

Transmission rates of the series range from 300- to 1,200 bit/sec, according to a company spokesman.

Acoustic models, both Bell- and CCITT-compatible, have been developed to interface with the Teletype Corp. Model 43, Digital Equipment Corp. Model LA36 and Texas Instruments, Inc. Model 733 terminals, the spokesman said.

The modems have the capability for direct connection to a telephone line; Novation's power pack plugs directly into wall sockets, according to the firm.

Novation has also developed a modular rack which accommodates up to 16 direct connect modems in a standard 19-in. rack.

Prices for the units range from $185 to $595. Novation is located at 18664 Oxnard St., Tarzana, Calif. 91356.

CICS USERS

DASD's new utility map generator (MAPGEN) will increase your BMS coding productivity by at least 75%.

MAPGEN is not a new language. It is a system where the completion of a simple specification form will greatly improve accuracy by eliminating unnecessary data, add flexibility and greatly simplify maintenance. All DFHMSD, DFHMDI and DFHMDF macro source statements are program generated.

A hard copy image of each screen is automatically printed at the time the map is defined.

'Map build' features aid in the use of extended features under CICS/VS.

Call of write today

DASD CORPORATION
National Marketing
1480 Renaissance Drive — Suite 315
Park Ridge, Illinois 60068
312/299-5005

DASD CORPORATION

NCE LEASE•RENT PURCHASE

- DIABLO 1620, 1641, 1660
- ACOUSTIC COUPLERS
- DECWRITERS LA 36, 120, 180
- ADDS CRT's
- TRI DATA FLOPPY DISC
- TELETYPES— TWX/TELEX 32, 33, 35, 43

*SEE US AT INTERFACE '78

NCE Call or write for more information...
NCE TERMINALS & COMMUNICATIONS, INC.

Regional Office—East
300 Raritan Ctr. Pkwy
Bldg. 806
Edison, NJ
201-225-0872
Toll free #
800-631-5366

Headquarters Office Midwest
1536 Brook Drive
Downers Grove IL 60515
312-629-7810
Toll free #
800-323-1780

Regional Office—South
1110 Busch Blvd
Tampa, FL
813-932-2666

Engineering Professionals:

Cruise Boston Harbor With Us

We'll be conducting shipboard interviews during ELECTRO '78 on May 24 and 25. For more information, see our ad in the help wanted pages of today's paper.

GTE SYLVANIA
GTE Sylvania
Electronic Systems Group...
A World of Communications.
an equal opportunity employer m/f

SIMPLAN®

Are important questions about your business going unanswered? SIMPLAN provides answers to those important questions. It is the most powerful, flexible, easy to use computer based analysis system.

SIMPLAN is an integrated system designed to provide all necessary computer based support for corporate planning, analysis, budgeting, forecasting and modeling. SIMPLAN features include:

- a flexible database system
- powerful consolidation capabilities
- [illegible]
- [illegible]
- [illegible]
- graphics
- a complete security system

[illegible]

(Advertisement) *(Advertisement)*

NATIONAL —SPECIAL LEAR SIEGLER ISSUE—

INFORMER

CAR RUNS ON ASPHALT!

May 22, 1978

DUE TO OVERWHELMING PRESSURE:

COMPLETE DISCLOSURE OF PROJECT X IMMINENT

Dumb Terminal To Make Special NCC Appearance

Page 10

★ ★ ★

Soviets Protest Deployment of Project X Devices

Page 15

★ ★ ★

Top Aide Confesses— "I've Known About Project X for Months"

Page 21

★ ★ ★

Ballistic Printer Reportedly Changing The Printer Industry

Page 25

★ ★ ★

World Leaders Call for Disclosure Of Project X

Page 29

★ ★ ★

Movie Rights to Project X Sold

Page 35

Top-ranking officer Lee Falco, cornered by reporters. Falco refused to acknowledge Project X rumors. INFORMER PHOTO

Due to last week's daring commando raid on Lear Siegler HQ, pressure is mounting for complete public disclosure of the ultra-secret Project X.

Public outcry and heavy governmental influence is beginning to make itself felt at the highest levels of LSI HQ's staff. Lee Falco, a top-ranking officer on Project X, refused to confirm rumors of an impending, full disclosure, but was unable to completely rule out such a development. When questioned directly concerning the declassification of the project, Falco said only, "Any such development has yet to be decided on, and I personally have heard of no decision being made either way..." When asked about last week's raid and its implications, however, Falco refused comment.

It seems clear to the INFORMER, nonetheless, that LSI's hush-hush Project X will soon go public, doubtless with built-in safeguards to protect certain technological breakthroughs developed by its staff of wizard-scientists. Initially begun as a way to ensure LSI's total mastery of this year's NCC (National Computer Conference), Project X has continued to be a mystery-shrouded undertaking fanatically protected by platoons of internal LSI guardsmen.

Just this morning, our gallant field operative escaped from LSI HQ and made his way to the INFORMER Building with information regarding yet another incredible device.

Exhausted and emotionally drained, he told us in hushed tones of Project X's new VDP-1000, a complete small data system. Amazed, we learned the VDP-1000 includes a Dumb Terminal,™ a Model 310 Ballistic™ Printer, a 16-bit CPU, 16-bit words of dynamic RAM and a cartridge or floppy disk. Our agent then lapsed into a shaken silence that affected everyone in the room for several minutes.

Other INFORMER sources have stated they are onto something so huge, however, that it could blow

(Please turn to page 5, column 2.)

Upgrade to IBM 6250 BPI tape drives now!

SAVE IBM RENT ELIMINATE DOWN-TIME
caused by field conversion

We will purchase your IBM 800/1600 BPI drives now & install 3420-4/3420-6 drives immediately from inventory

Call Nick DiBari
312-698-3000
or your nearest Comdisco office

COMDISCO

Available Immediately For

SHORT TERM LEASE

370/138 370/148 370/145
3330's and OEM 3330's
360/30 360/40 360/50 360/65's
Greyhound Phoenix ICA's

CALL US COLLECT

United States		
Austin	Ron Geil	(512) 451-0121
Boston	Tom Ryan	(617) 272-8110
Chicago	Dave Bays	(312) 298-3910
San Francisco	Dave Hylahd	(415) 283-8980
International		
Canada	Don Maunder (Toronto)	(416) 366-1513
Mexico	Andres Contreras	(905) 543-6850
Eurasia (U.S. inquiries)	Don Haworth (Dallas)	(214) 233-1818
U.K./Europe	Joe Gold (Geneva)	(022) 61-27-54
Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
Non-IBM:		
UNIVAC or	John Hallmark (Dallas)	(214) 233-1818
CDC only)	Don Haworth (Dallas)	(214) 233-1818

GREYHOUND
COMPUTER CORPORATION
GREYHOUND TOWER, PHOENIX, ARIZONA 85077

Works With Existing 255

NCR Has Another Checkout Unit

DAYTON, Ohio — NCR Corp. has introduced a modular terminal, the NCR 2552, for its checkout systems that are used in the food and mass merchandising industries. The terminal supplements the NCR 255 terminal, which will continue to be available.

The NCR 2552 terminal uses the same 64K-maximum in-store NCR 726 minicomputer and software programs as the NCR 255; the two can be intermixed in the same store, according to a spokesman.

The NCR 2552 is comprised of separate components, including electronics module, power supply, keyboard/display/cash drawer, customer display and up to three printers, the spokesman said. The various modules can be grouped together or placed at separate locations at the checkstand.

The terminal can be provided with receipt, journal and slip printers which, according to the firm, are compact in size and use dot matrix characters.

Prices for the NCR 2552 terminal, including keyboard/display/electronics module, cash drawer and three printers, begin at $3,445.

Register Bows

NCR also recently introduced a stand-alone electronic cash register which provides basic sales-recording and cash-control functions as well as automatic tax computation and change calculation.

The NCR 2115 has two printing stations, a minimum of 400 hours of memory protection against electrical outages and the ability to store running totals in such categories as sales by department, net sales, taxes, cash-in-drawer, void, refund, charge, received-on-account and paid out, the spokesman claimed.

The 2115, at a price of $995, will succeed certain models of the NCR 210 series, which until now was NCR's lowest-priced cash register family, NCR said.

MSI Handheld Terminal Offers Segmented Memory

COSTA MESA, Calif. — A handheld data entry terminal with a segmented memory has been introduced by MSI Data Corp. According to the firm, the MSI/88 represents the next step in MSI's family of CMOS solid-state terminals.

In addition to a segmented memory, the MSI/88 features a programmable accumulator and memory capacity ranging from 24,000 to 48,000 characters, a spokesman noted.

Other features of the MSI/88 are a 16-digit LED display and bar code wand-scanning capability for the Universl Product Code and the MSI code.

Scans Codes

In addition, MSI will soon provide the capability for the MSI/88 to scan the Codabar code and the European Article Numbering (EAN) system, the European equivalent of the Universal Product Code.

Segmentation of the MSI/88's memory permits it to be divided into as many as nine separate parts of varying sizes. Each part can be treated independently of the others for as long as the user desires, the firm claimed.

Data transmission, editing, erasure or searching can be accomplished on a segment basis by means of a selection, or "page," key.

The MSI/88's programmable accumulator provides users with audit control of data entered into the terminal. The accumulator is usable in such applications as accounts receivable and payroll processing, collection of inventory data or scheduling and compiling departmental financial totals, the spokesman said.

Prices for the MSI/88 will range from $1,895 for the 24,000-character memory configuration, with volume pricing available.

Deliveries will begin in the fourth quarter, MSI said from 340 Fischer Ave., Costa Mesa, Calif. 92626.

IDS Extends Minitech Line

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has introduced its Model 8965 controller and power module for its Series 8900 Minitech communications switches.

Located at a remote site, the Model 8965 receives switching information from the Model 8935 selector, the firm said.

The Model 8965 controller and power module is installed in the leftmost slot of a Model 8903 cage assembly to provide remote control for as many as eight Series 8900 A,B switching modules (16 channels). Each Model 8965 in a remote control system has a unique address used by the Model 8935 for cage selection, a company spokesman said.

Status Data

Encoded switching information and A,B status interrogation sent from the central site is decoded and passed to the appropriate channel. Status information is extracted from the modules, encoded and sent back to the central site for display.

LEDs monitor 12 key EIA signals appearing at the Monitor in front panel connector. A lamp test pushbutton is also provided to light all LEDs in the entire 16-channel system for test purposes, the spokesman said.

The Model 8965 costs $1,000 from IDS at 100 Nashua St., Providence, R.I. 02904.

Concentrator Gets Greater Capacity

CHATSWORTH, Calif. — Micom Systems, Inc.'s Micro 800 data concentrator is now available in 12- and 16- channel configurations as well as 4- and 8-channel models, the company recently announced.

The Micro 800 was designed to permit several terminals, typically Teletype-compatible terminals operating at 300-, 1,200-, 2,400- or 4,800 bit/sec, to share one telephone line "to minimize line and modem costs," according to a Micom spokesman.

The Micro 800 costs $2,100 for a 4-channel unit, $3,000 for an 8-channel unit and $5,200 for a 16-channel unit.

Micom is located at 9551 Irondale Ave., Chatsworth, Calif. 91311.

WYLBUR™*

Gives you big shop "TSO capabilities" on small-to medium-size 370's.

Of course your staff would like the kind of on-line program development tools the big shops have. But, putting TSO on your 370/135, 138, 145, or 148, would really hamstring your CPU.

The answer is WYLBUR. It provides the best in on-line programming and document formatting with very little impact on your existing through-put. WYLBUR helps attract the best programming talent. And, its low operating cost will astound you.

Even if you have a big shop, WYLBUR can help solve the TSO resource requirements problem without eliminating TSO.

For powerful, fast response program development and document formatting in the following environments:

- CPU: IBM 370/135, 138, 145, 148, 155, 158, 165, 168 and 303X.
- OS: MVT, VSI, SVS, MVS (with no mods required).
- Terminals: 3270—local and remote. Start-stop—TTY or 2741 compatible.

You owe it to yourself to call (415) 391-9555 or complete this coupon and send it to OBS TODAY!

**WYLBUR is a mark of Stanford University*

On-Line Business Systems, Inc.
115 Sansome Street, San Francisco, CA 94104

Gentlemen: Please RUSH detailed information about WYLBUR. Our need is:
☐ immediate; ☐ near term; ☐ long term; ☐ informational.

Name ________ Title ________
Company ________ Address ________
City ________ State ________ Zip ________
Telephone No ________ Op System ________

DP Dialogue

Advertisement

Notes and observations from IBM
that may prove of interest to
data processing professionals

DMS Tees Up Online System Fast for Karsten

Karsten Manufacturing makes professional quality golf clubs, highly custom-configured to the physique and style of each golfer. Such individualized service has made online order entry the company's most complicated computer application. A clerk enters extensive and detailed orders by touching a light pen to the screen of an IBM 3277 Display Station, using one or more of 20 different display formats.

Yet the order entry system was written and installed in the company's System/370 in six weeks. William Gingerich, data processing manager for the Phoenix-based manufacturer of golf balls and clubs, attributes this to the use of Display Management System (DMS).

An IBM program product, DMS converts information from a fill-in-the-blanks form directly into executable programs. It generates and displays user-defined screen formats, processes terminal transactions, and accesses an existing data base or one newly defined under DMS. Screen formats can be revised and new ones added quickly and easily, without reprogramming.

"DMS gets a screen up in a few days," says application programmer Catherine Boyd. "I specify a format by making entries on a preprinted form. As soon as this is keyed into DMS, the screen is available at the 3277. It's equally simple to program the flow from one screen to the next within a transaction—from order entry to credit check, for example."

"We make heavy use of the 'browse' functions in DMS," adds Gingerich. "Order clerks identify a customer account by entering a partial name, a zip code, or the name of the pro shop through which the clubs were ordered.

"Applications involving data-base inquiry are particularly easy to write with DMS," he continues. "In less than a day we wrote a program that makes inquiries against our payroll file."

The company was launched by Karsten Solheim, an engineer, after he developed the "Ping" putter, a golf club famous for its accuracy. Not much more than a decade old today, Karsten Manufacturing acquired its first System/370, a Model 125, in October 1974 and its present Model 138 in May 1977.

"Inventory management is a challenge in this business," notes Louis Solheim, Karsten's son and vice president of the company. "There are many variables in a wood club: swing weight, face orientation, shaft style, model and type, for example. Since it takes two months to process a wood through manufacturing, we need close control to have the required heads available."

"The inventory control system," adds Gingerich, "was written by one person in three or four weeks. DMS makes implementing an online system, using multiple screen displays, at least as easy as writing a simple batch application."

Marine Biologist Chick Gaddy on Caper's Island, east of Charleston, South Carolina.

Preserving the Heritage of the Palmetto State

In a program to preserve its irreplaceable natural resources, the state of South Carolina has collected data on more than 400 sites, ranging from the breeding grounds of the rare loggerhead sea turtle to stands of timber more than 400 years old.

"In South Carolina, we are very proud of the beauty and heritage of our state," says Dr. Wayne Beam of the Wildlife and Marine Resources Department, "and we want to preserve it for future generations. Now we can make recommendations on land use permitting development compatible with conservation of natural resources.

"The value of the program is in rapid pinpointing of needed information," Beam continues. "We generate hundreds of thousands of characters of new data each month in our field survey work. There is no way to handle a state-wide assessment like this and have it do anything but sit in the files unless it is automated."

Areas surveyed contain rare or endangered species of plants or wildlife, unique and outstanding natural features, historical sites and buildings. Complete information for each location is entered into an IBM System/370 at the University of South Carolina. The goal is to provide the data that planners need to assess the impact of future development.

Accumulated details on animals of special ecological significance include all their feeding and habitat requirements, their geographical distribution, the environmental limits they tolerate and their breeding and nursery areas.

The program is called Heritage Trust and was developed in collaboration with The Nature Conservancy, a privately funded organization based in Arlington, Virginia, which is working with other states on similar programs.

Beam adds: "By doing keyword searches we can quickly compile a list of all locations where the gopher tortoise has been sighted, or other such extracts. And using the computer we can do analytical work—correlating such factors as size and fecundity, to help improve commercial fish harvests.

"We recognize that we are a growing and developing state and must make the most effective use of our land from an economic as well as an ecological standpoint. The computer will give us the capability to compare sites, assess their relative importance and decide which areas contain unique values that should be preserved."

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM
DATA PROCESSING DIVISION

Programmable System

Motorola Boards Make Up CRT

PHOENIX — Motorola Microsystems has expanded its line of microcomputer boards to configure the modularized Multifunction Programmable Terminal System. The system is intended to raise the level of componentry available to computer system manufacturers for the production of their products, according to a company spokesman.

Named Exor 68, the system offers a choice of building blocks with which to configure CRT-oriented equipment. It consists of three separate groups of matched macrocomponents from which a user can choose to give his system its desired capabilities, the spokesman said.

The three groups include a basic CRT unit, a variety of keyboard options and a group of microcomputer subassembly boards.

The CRT unit consists of a video monitor with up to 1,920 characters, 24 lines and a 12-in. screen. In the basic system, internal character generators produce 128 different characters, including 96 upper/lower case Ascii characters, 24 lower-case Greek characters; two upper-case Greek characters (omega and sigma) and six special characters.

The system can be supplied with other generators to meet a customer's specific requirements, according to the firm.

Built-in electronics permits operation with RS-232C transmission and with 20/60 mA current-loop equipment, the firm said.

Switches also permit the selection of word length, transmission rate, communications mode and modem control, the spokesman claimed.

Other features include blinking inverted cursor, audible alarm and optional compatible motherboards for expanding system capabilities with up to eight additional micromodules or Exorciser boards.

The basic CRT unit with its built-in electronics is available separately for end applications requiring no keyboard entries.

Motorola is offering six keyboard arrangements as optional extras. A keyboard can be connected to a CRT with optional-length cables, the spokesman said.

Micromodules are available ranging from relatively simple partial computers — for example, microprocessor modules, memory modules or interface modules — to complete single-board microcomputers, the firm said. All are compatible with the Exor 68 system and can be installed within the terminal card cage through an 8-card motherboard that is an optional offering with the system.

The cost of the system varies in accordance with the desired options. A typical configuration including a CRT unit with extended communications and display features, keyboards and cable assembly sells for approximately $2,600.

Motorola Microsystems is located at 3102 N. 56th St., Phoenix, Ariz. 85018.

Managers Set Meeting

PORT CHESTER, N.Y. — The second annual Communications Managers Association (CMA) conference and exhibition is scheduled for Oct. 17-19 at the Rye Town Hilton Inn here. The theme of this year's conference will be "Telecommunications Challenges/Opportunities — 1978."

Participation in the conference is open to anyone with communications responsibility for a company, but not employed by a common carrier, equipment supplier or communications consultants, according to a spokesman.

Fees are $50 for CMA members and $75 for nonmembers. Further information is available from Charles Schweis, Ciba-Geigy Corp., 444 Saw Mill River Road, Ardsley, N.Y. 10502.

(402) 392-2606
VOLUME DATA ENTRY SERVICES . . .
TAPE OR CARDS
"QUALITY AT A LOWER COST"
AMERICAN KEYDATA
Mid America Plaza, Suite 144
7171 Mercy Rd., Omaha, Ne. 68106

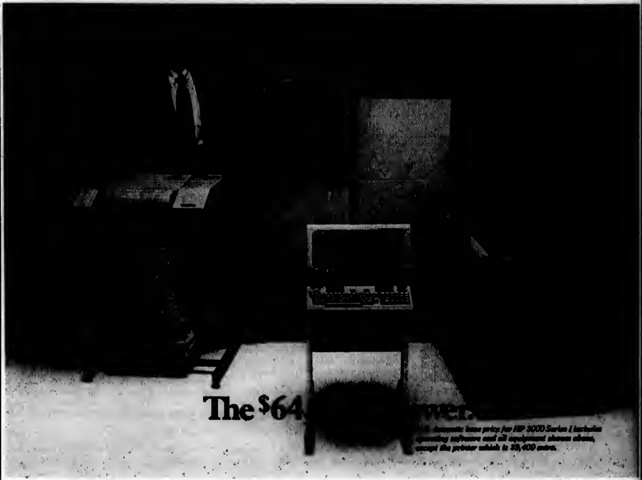
Man cannot live

That's why so many companies are firing their small batch systems and hiring the Hewlett-Packard 3000.

Our computer can easily handle your payroll, accounting, general ledger and other number-crunching jobs you're currently running on a time-sharing service or small in-house system.

But it also gives you immediate access to the information you need right now. Today's sales, inventory status, customer profiles, shipping records, updates on accounts receivables, projections — all these and more can be called up on CRTs or printing terminals.

Just about every business, from manufacturing and distributing to retailing and publishing, needs that kind of up-to-the-minute data. And, with prices starting at $64,000,* it's easy to make the switch to an HP 3000.



domestic base price for HP 3000 Series I includes operating software and all equipment shown above, except the printer which is $3,400 extra.

Adcu Plans June Seminar

LANCASTER, Pa. — The Association of Data Communications Users (Adcu), Inc. will hold a seminar and its third annual national meeting June 26-28 here.

Keynote speaker for the event will be Bill E. Brice, who was the lead attorney in the 1968 Carterfone decision.

Sessions to be held include "Industry Status and Forecast," "Specialized Common Carrier Status and Forecast," and "Common Carrier Line Impairments, Monitoring and Trouble Reporting."

The business meeting, to be held Aug. 28, and other member-related activities are restricted to members only.

For further information, contact Harvey Hershkowitz, vice-president, Chase Manhattan Bank, 1 New York Plaza, New York, N.Y. 10019.

Dynabyte Offers Dumb Terminal

PALO ALTO, Calif. — Dynabyte, Inc. has introduced the Naked Terminal, an S-100 microprocessor module that functions with a keyboard and CRT monitor.

The terminal displays 80 characters on 24 lines using both upper- and lower-case characters in a 5 by 7 dot matrix font, the company said.

Half-duplex, full-duplex and a block mode that allows editing before transmission are features of the terminal. Editing is aided by an addressable cursor.

Switch-selectable features include black-on-white or white-on-black, blinking or nonblinking underline cursor and variable transmission rates, according to a spokesman.

Software Unnecessary

No software is required, Dynabyte claimed. The terminal can be configured by dip switch to drop into an existing system, replacing the serial I/O card and stand-alone terminal without making any changes to software, the spokesman added.

The terminal contains a microprocessor and its own memory, software drivers and internal bus. It will not take up any of the 64K memory space on an S-100 bus, the firm said.

The unit is assembled, socketed, tested and burned in and carries a one-year warranty, the firm said.

The Naked Terminal sells for $350; a connector kit is available for $15.

Dynabyte is located at 4020 Fabian, Palo Alto, Calif. 94303.

by batch alone.

Two major features put the HP 3000 in a class by itself. The first is our state-of-the-art operating system, a Multiprogramming Executive that can manage a vast workload extremely fast. When we clocked one second of MPE activity, it handled 2,280,000 micro instructions in the central processor, 14 file accesses, seven input swaps and five output swaps.

This ability to "juggle" batch and on-line jobs lets you develop new programs on the HP 3000 while it's running your old ones. And we offer six "big computer" languages to keep your programmers happy. With COBOL, RPG, FORTRAN, BASIC, APL (Series II only), and SPL (our streamlined Systems Programming Language), you can develop the precise programs your company needs.

Virtual memory plays an important role in this performance. It gives you an almost unlimited program size by keeping the code and data on your disc, swapping only those parts that are needed in main memory. This operation is totally transparent to the user. And it's speeded up by our new 50 megabyte discs, with 5 ms seek time track to track.

The second major attribute is the HP 3000's powerful data management capability. Our IMAGE/3000 software, good enough to be named to the Datapro Software Honor Roll, puts a sophisticated Data Base Management system (1) literally in your hands. You can access files of consolidated data with our simple inquiry language, QUERY. Or use KSAM (Keyed Sequential Access Method) on our Series II to call up a series of related files. Our DEL/3000 Data Entry Library simplifies your terminal-oriented transactions.

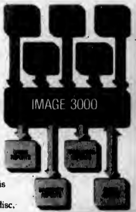
A variety of HP terminals also makes it easier to input or call up data. For instance, our new graphics terminal (2) provides auto-plots at the touch of a key. And a new printing terminal (3) keeps information flowing from the factory or warehouse.

Another "big computer" feature is fault-correcting memory on the HP 3000 Series II. If a circuit fails, the memory automatically corrects itself and stores information about the faults in a RAM. Our engineers will call up that information during routine maintenance and replace the faulty circuit.

We offer two basic systems, based on CPU speed and main memory size. They're both very easy to expand to fit your needs, with additional discs, tapes, terminals, printers and other I/O devices. And, as we manufacture virtually everything in our systems, we can give you fast, knowledgeable service on any part of them.

So why don't you call the nearest HP office listed in the White Pages? Or write to Hewlett-Packard, Attn: Bill Krause, Dept. 315, 11000 Wolfe Road, Cupertino CA 95014. After all, why should you put up with a computer that only does half your work, when you can have one that does it all?

1.



2.

3.

HEWLETT hp PACKARD

47602HPG11

Bell Will Use Lightwaves

CHICAGO — The Bell System reportedly will have its first lightwave communications link in regular service by the end of 1980.

The decision to proceed with regular service was based to a large degree on the success of the lightwave system that has been in operation in Chicago during the past year, a spokesman said.

The Chicago lightwave system runs about 1.5 miles under downtown streets and carries voice, data and video communications on pulses of light transmitted through hair-thin glass fibers. The evaluation has been under the direction of Bell Telephone Laboratories and AT&T, with Illinois Bell Telephone Co. and Western Electric Corp. also participating.

The adaptability of lightwave technology to a variety of customer needs had been demonstrated by the Chicago system in the handling of voice, data and video signals, AT&T said.

The evaluation has also proven the value of a "systems" approach to lightwave communications, in which individual components — lasers, LEDs, fibers, detectors, connectors and terminal gear — are developed, fabricated and installed as integrated elements for maximum performance and cost-effectiveness, a spokesman said.

Texas Instruments
Portable Data Terminals
FOR SALE
• 743 • 745
YOU CAN'T BEAT OUR PRICE
CALL TOLL FREE 800-323-2288
IN ILL. CALL 312-279-1960
Data Equipment Group
ICE, INC
772 N Church Rd
Elmhurst Ill 60126

Control Data's experience in Flexible Disk Drives helps bring success to OEM's

In the past two years alone, Control Data has built more than 50,000 floppies for our OEM customers. Experience and success. It means quality and reliability that you can pass along to your customer.

Control Data now offers a complete line of flexible disk drives and subsystems. From our Model 9400 first introduced in 1973 to our recently announced two-sided, double-density Model 9406.

Select the one that's right for your application:

Model	9400	9404	9406	9474 Subsystem
Capacity (Megabytes)	0.4	0.4-0.8	0.8-1.6	0.4-6.4
Type of Recording	FM	FM or MFM	FM or MFM	FM or MFM
IBM Compatibility	FD23	FD23	FD43	N/A
Interface	STAR	DAISY	DAISY	DAISY

Put quality behind your nameplate. Call 405/946-5421 or if in Europe, contact one of our European representatives. Or mail return coupon to:

Terry J. Hardie, Product Sales Manager C-522
Control Data Corporation, 4000 NW 39th
Oklahoma City, Oklahoma 73112.

Please tell me more about your
☐ flexible disk drives ☐ flexible disk drive subsystems

Name __________ Title __________

Firm __________ Phone __________

Address __________

City __________ State __________ Zip __________

CONTROL DATA CORPORATION

More than a computer company

See us at the NCC in booth 2609.

With 117% of 3031 Performance

Univac Makes 90/80-4 Head of Family

By Frank Vaughan
CW Staff

BLUE BELL, Pa. — Univac has introduced a top-end model for its 90/80 product line that reportedly offers 35% more performance than the 90/80-3, previously the largest model in the 90/80 family.

The virtual system, known are the 90/80-4, also offers approximately 117% of the performance of the IBM 3031 processor, Univac claimed.

The 90/80-4 is a follow-on product to the 90/80-2 and 90/80-3, according to the firm, and users seeking an upgrade from one of those models do not require a CPU swap-out or changes in peripherals. The 90/80-4 uses Univac's VS/9 operating system and is compatible with the firm's 90/60 and 90/70 product line.

The system's CPU architecture is common with that of earlier models in the series, and its physical requirements for floor space, heat dissipation, power and air conditioning are the same as the smaller models, according to a spokesman.

Two of the most significant features of the system are the main storage capacity — which can range up to 8M bytes, double that of the 90/80-3 — and the addition of a 32K-byte buffer storage (cache memory).

The main storage is expandable from 2M bytes to 8M bytes in 2M-byte increments packaged in twin Semiconductor Storage Modules (SSM), the firm said.

The 32K-byte buffer storage is equally divided for handling instruction and operand data. To make the most efficient use of the buffer storage, the 90/80-4 has two-way memory interleaving, Univac said.

Univac 90/80-4

For fetches where data is not stored in the buffer, interleaved requests by the Storage Interface Facility (SIF) to both SSMs allow loading of 16 bytes of information at one time into the buffer, it claimed.

The system comes with five I/O channels consisting of four block multiplexers and one byte multiplexer; it is expandable to a maximum of eight channels, the firm said. The full configuration can be either six block and two byte multiplexer channels or seven block and one byte channel.

The CPU has two sets of 16 registers and four floating-point registers. The average insruction execution time is in to 400 nsec to 500 nsec range, while a basic machine cycle takes 98 nsec, according to the spokesman.

The system has a read access time of 280 nsec for 8 bytes from main memory, he said, noting the maximum transfer rate is 16M byte/sec.

The firm's VS/9 operating system handles batch, interactive and communications environments and uses the Data Base Management System 90 (DMS 90) and Information Management System 90 (IMS 90). Languages supplied include Cobol, Fortran, Assembly, RPG, RPG-II and APL.

A 90/80-4 processor "group" with 2M bytes of main storage sells for $1,256,000 with a monthly maintenance fee of $3,300. Short-term lease prices are $32,535/mo while a five year lease price is $24,400/mo, the firm said.

An additional 2M bytes of storage sells for $319,300 with a monthly maintenance fee of

(Continued on Page 48)

Record Crowd Views Micrographics '78

By Tim Scannell
CW Staff

BOSTON — The National Micrographics Association (NMA) exposition, Micrographics '78, which took place here recently, opened amid a steady rainfall and closed with record-breaking attendance figures.

More than 133 exhibits filled the four-acre John B. Hynes Veterans Auditorium, offering the enthusiastic visitors a wide selection of products to view as well as a look at the current status and future trends of micrographics. Approximately 4,000 people attended the event on opening day, registration officials said.

Every booth on the show floor attracted healthy numbers of visitors from industrial, chemical, federal and state government organizations, Interest in the various vendor displays was sparked by such give aways as plastic bags bearing company logos, buttons, badges and adhesive patches. Several of the major vendors staged contests which offered cameras and all-expenses paid trips as prizes.

The 3M Co. presented a "magic of Microfilm" show hosted by a magician who performed various feats of legerdemain while Bell & Howell, not to be outdone, attracted crowds with a mindreading demonstration.

One of the most popular aspects of the exposition was the series of sessions based on the theme of the conference, "Building Information Bridges." The 23 seminars featured approximately 95 speakers on such topics as competing system technologies, equipment analysis and system design, micropublishing, in-house vs. external services and future market and production trends.

CW at NMA

Computer output microfilm (Com) and micrographics applications were discussed in relation to banking and finance; engineering systems, health and medicine, insurance and retail/wholesale operations.

Because the annual NMA show is the prime marketing forum for the micrographics industry, according to a spokesman, several products were unveiled.

Datagraphix, Inc. introduced its on-line Autocom II, an intelligent microfiche recorder that incorporates a 32K-byte microcomputer system and was designed to interface with the IBM 360 Model 25 and up, the 370 line and 30 series of processors. The unit can reportedly process data into titled and indexed microfiche at speeds up to 12,000 line/min.

Fuji Photo Film USA, Inc. introduced the Laser COM system, which uses a laser beam to convert data signals to microimages and record them on metal evaporated film. The system has 155K bytes of random-access memory; its average throughput is 8,000 to

(Continued on Page 48)

mti
159 Northern Boulevard
Great Neck, NY 11021

TERMINALS
LEASE • RENT • PURCHASE
MTI's got them all including a complete line of accessories all at the lowest prices with quick delivery!
For a Quick Response Call TOLL FREE 800-645 8016 NOW!
In New York Call 516 482 3500 or 212 895 7177
Ask for Bert or Lenny

Save Time & Money
COME TO ONE SOURCE FOR THE BEST BUYS IN COMPUTER PERIPHERALS

digital
DEC writers • LA35/36

digital
• LS120 Teleprinter

LSi LEAR SIEGLER
• ADM 1 and ADM2 Smart Terminals
• ADM3 Dumb Terminal

digital
DEC Scopes • VT50 • VT52

Diablo
Hyterm
Bell 103A Interface
• RS-232-C Interface

Digital Cassettes

OMNITEC
Couplers & Modems

intel
Micro Computer Systems

INVENTORY SALE

DEC LA-36 30 cps Teleprinter
LS-120 120 cps Teleprinter
LA-180 180 cps Printer

*All Standard DEC Options
While they last - at
UNBELIEVEABLE PRICES

ALSO - Lear-Siegler
ADM-1A, ADM-2, ADM-3A
Sykes - Comm-Stor
Multi-Tech - Acoustic Couplers

James L. Highsmith & Co.
3733 Monroe Rd. • Charlotte, N.C. 28205
1-800-438-4942 Toll Free
1-704-333-7743 in North Carolina

CARD-READER TERMINAL

This powerful new concept in terminal equipment is offered for TTY type terminal replacement as well as for 3277 replacement*.

- Typewriter style keyboard
- 80 x 24 character display
- Optional hand-fed badge or card reader (standard Hollerith type cards)
- Optional modems for remote use
- 12" diagonal screen
- Half or Full duplex
- Keyswitch lockout of keyboard
- Optional printer interface
- Switch selectable baud rate and bit pattern to 19.2K BPS

*Requires Phone 1's P1-5 MUX controller when used as 3277 replacement.

PHONE 1
P.O. Box 1522
Rockford, Illinois 61110
Phone 815/962-8927

On-Line Film Processing Seen in Future COM Units

By Tim Scannell
CW Staff

BOSTON — Computer output microfilm (Com) systems of the future will be smaller, use less energy and incorporate on-line film-processing methods, Larry D. Brown, a manager with Synergraphics, said at Micrographics '78 recently.

The use of minicomputers with COM units, while not a new idea, will increase as time goes on to the point where micrographic systems will be considered as peripherals rather than systems assisted by a minicomputer, Brown predicted at the exposition sponsored by the National Micrographics Association (NMA).

Eventually, "smart" systems — those containing their own CPU — will dominate the industry, resulting in an increased use of distributed micrographic processing, Brown said. Unformatted magnetic tapes created at one site will therefore be able to be processed at a remote station, relieving the host computer of the controlling function, he added.

Brown's projections were echoed by David T. Bogue, director of technical services for the Zytron Corp., who shared the stage during the session. Bogue noted that in 1970, 85% of the COM units in use were designed to function in an off-line capacity, according to figures supplied by NMA: This figure was raised to 95% in 1977.

Of all the alphanumeric COM units installed in 1977, NMA figures showed, only 4% were configured as strictly on-line equipment.

CW at NMA

Computer-controlled COM systems have several advantages over those not controlled by a computer, Brown stated. Smart COMs can accept numerous input formats, they do not require altered magnetic tape, the output parameters are easily changed and intelligent units are not restricted to specific tape block structures, he said.

"Dumb" units, on the other hand, are simple to operate, less complex because they do not involve microprocessors or integral computers and less expensive, Brown said.

COM systems using nonintegral or separate development systems will eventually be replaced by those using integral development processes, Bogue said. Firms familiar with computerized micrographics and the "wet processing" it usually involves are showing an increased interest in machines that process the film internally and deliver a dry or semidry product both because of the time saved and the chance to check recorded data immediately.

Univac Caps 90/80 Line

(Continued from Page 47)

$800. Short-term rental costs $8,270/mo and long-term lease costs $6,200/mo.

A 90/80-3 to 90/80-4 upgrade costs $236,900 with a monthly maintenance fee of $600. The short-term lease price is $6,135/mo while the long-term rate is $4,600/mo.

Typical System

A typical system with the 90/80-4 processor "group," 2M bytes of main storage, a 1,000 card/min reader, 250 card/min punch, two 2,000 line/min printers, dual channel tape control, four 780K-byte tapes, four 470K-byte tapes, dual-access disk control, four 307M-byte disks, four 200M-byte disk and communications control with 40 lines sells for $2,577,456 with a monthly maintenance fee of $9,435.

The short-term rental fee for this configuration is $75,834/mo while the long-term lease costs $56,939.

The first customer shipments are expected to begin in January, Univac said. The vendor can be reached at P.O. Box 500, Blue Bell, Pa. 19422.

Record Crowd At NMA Show

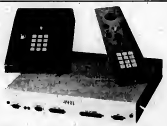
(Continued from Page 47)

9,000 page/hour, a spokesman stated.

Many products in the area of intelligent control systems were also shown, including a console from the Access Corp. that is microprocessor-based and constructed to interface with the firm's document storage and retrieval systems.

Other Interests

The majority of the people at the conference and on the exhibit floor were basically interested in microfilm storage and microfiche systems, but if the size of the crowds was any indication, COM and computer-assisted retrieval products and sessions were readily accepted.



Direct-Connect to TWX/DDD RJ45S Interface . . .

Add DAA and TAA coupling plus RS232C interface — all with touch-tona dialing format and you have our new **4000 SERIES MODEMS.** This advanced direct access modem is designed to minimize usar charges. It has a built-in answer back option for data set and an axclusive signal regeneration circuit that practically aliminates bias distortion, plus tarminal automatic speed control and much more.

Write Dept. 58 or call
(602) 252-2083 collect.

OMNI-TEX

OMNITEC DATA
"New Dimensions in Modems"
2405 South 24th Street • Phoenix, Arizona 85034

See us at NCC '78 Booth 1450 and 1452

Intertec's

Superdec™

"pull out the guts & screw in the brains"

While we'll admit the difference in appearance between the DECwriter II and our new Superdec is difficult at best to see, the difference in performance is astounding! The Superdec is our new Throughput Optimizer designed to be easily installed in your existing DECwriter II teleprinter. Not only can our Superdec Optimizer increase the print speed of your DECwriter II by as much as six times its original speed, it also gives you the features offered only by our famous SuperTerm teleprinter. Features you couldn't get on your DECwriter until now.

You've undoubtedly already heard of our SuperTerm. It's the 1200 baud teleprinter that has been replacing DECwriters by the thousands. And while you may have purchased your DECwriter prior to the introduction of our state-of-the-art SuperTerm, you can now have all of the SuperTerm's incredible features without having to throw out your DECwriter.

With the Superdec Optimizer installed, you will have such nifty features as bidirectional printing, manual and automatic top of form, full horizontal and vertical tabs (addressable and absolute), adjustable right and left margins, an RS-232C interface, a double wide character set and up to 32 user programmable characters. You can also add an APL character set, selective addressing and an answer back feature at nominal cost.

The Superdec Optimizer is designed to replace the digital electronics in your existing DECwriter II. In less than five minutes, your DECwriter can be transformed into a Superdec. The Superdec Optimizer is completely "plug-compatible" with the cables in your DECwriter. The only installation tool required is one that we give you—a screwdriver. Just pull out the guts and screw in the brains. No special technical skills are required. And if you get bored watching your DECwriter print faster than you can read, the old digital electronics may be reinstalled in a matter of minutes. It's really just that simple.

Every Superdec Throughput Optimizer carries a full one year warranty on all parts and workmanship. But our commitment to excellence in service goes beyond the warranty. Intertec can also offer on-site service contracts for all of your upgraded Superdec equipment. So, when you're ready to "pull out the guts and screw in the brains", contact us at one of the numbers below and we'll give you the name of your local Superdec dealer. He'll show you what a difference $395 can make.

$395.00 and
your old DECwriter

INTERTEC DATA SYSTEMS

Eastern Regional Marketing
19530 Club House Road
Gaithersburg, Maryland 20760
301/948-2400

Corporate Headquarters
1851 Interstate 85 South
Charlotte, North Carolina 28208
704/377-0300

Western Regional Marketing
17952 Sky Park Blvd.
Irvine, California 92714
714/957-0300

The Superdec and other Intertec products are represented in these cities: Albany, NY Alberquerque, NM Atlanta, GA Baltimore, MD Boston, MA Buffalo, NY Charlotte, NC Chicago, IL Cincinnati, OH Cleveland, OH Columbia, SC Columbus, OH Dallas, TX Dayton, OH Denver, CO Detroit, MI Hartford, CT Huntsville, AL Houston, TX Indianapolis, IN Jacksonville, FL Kansas City, KS Los Angeles, CA Louisville, KY Madison, WI Memphis, TN Miami, FL Milwaukee, WI Minneapolis, MN Nashville, TN New Haven, CT New Orleans, LA New York, NY Oklahoma City, OK Omaha, NB Philadelphia, PA Phoenix, AZ Pittsburgh, PA Portland, OR Providence, RI Raleigh, NC Richmond, VA Rochester, NY Sacramento, CA Salt Lake City, Ut San Antonio, TX San Diego, CA San Francisco, CA Seattle, WA St. Louis, MO Syracuse, NY Tampa, FL Tulsa, OK Virginia Beach, VA Washington, DC. **International offices** located in Australia, Austria, Canada, Denmark, England, France, Germany, Holland, Sweden, Switzerland.

DEC and DECwriter are registered trademarks of Digital Equipment Corp. Superdec is a trademark of Intertec Data Systems Corporation.

The $895 Dumb Terminal.

To make a terminal less expensive, you'd have to make it cheaper.

We've sold more than 30,000 Dumb Terminals around the world.

But none of them left our factory before they passed some pretty tough tests.

Each completed terminal must survive a minimum of 168 hours of burn-in and seven separate test cycles. We test power supplies, monitors, keyboards, and logic boards. Then we run another test on the complete assembly. Tests include functional, diagnostic, and debugging routines.

Only after a terminal passes all of these tests does it earn the name Lear Siegler.

So if you still want to buy a cheaper terminal than the Dumb Terminal, go right ahead. You'll get exactly what you pay for.

DUMB TERMINAL.
SMART BUY.

LEAR SIEGLER, INC.
ELECTRONIC INSTRUMENTATION DIVISION
DATA PRODUCTS

Lear Siegler, Inc./E.I.D., Data Products, 714 Brookhurst Street, Anaheim, CA 92803; (800) 854-3805. In California (714) 774-1010.

CW at NMA

Merits of CRT, Laser COM Devices Debated

By Tim Scannell
CW Staff

BOSTON — Representatives of four manufacturers of computer output microfilm (COM) equipment discussed the merits of the two major recording techniques — CRT and laser — in a "semidebate" here last week at Micrographics '78, sponsored by the National Micrographics Association (NMA).

Although the speakers' viewpoints differed slightly from a technical standpoint, all four ultimately agreed the laser has succeeded in expanding the world of information processing, but it will not replace the CRT as a printing medium.

The function of a COM system, Terry Anderson of Datagraphix, Inc. explained, is to receive input signals and transfer them to film "with adequate resolution and competitive speed." The system will incorporate some flexibility and reliability and will achieve a certain cost effectiveness, he added. The basic difference between CRT-type systems and laser-based machines lies in the amount of power needed to drive the unit and the resulting force of the light output.

The laser, when considered in this respect, Anderson said, is not a magical device, but simply a means of "deflecting a light source to produce multiple output beams."

The advantages of a CRT-based unit include simplicity, because there are no moving parts; lower cost; easy maintenance; full addressability on the screen; variety of beam shapes (raster, stroke and shaped); and field-proven technology. Although speed and resolution are also good, CRT units are outpaced by the laser, in these respects, he added.

A disadvantage of CRT systems is the limited light output resulting from the lack of concentration in the beam, Anderson stated.

The laser, because of its high energy output, produces a sharper image and functions at a higher speed, Anderson said, but there are many disadvantages associated with the technology. Laser systems are complex, they involve moving parts — and therefore careful maintenance — and they print in dot matrix characters only, he noted. In addition, because of the high output of energy, laser systems are subject to special government safety regulations.

Edward Ince from the Eastman Kodak Co. stressed that COM should be treated as a management tool and system objectives should include a high-quality output, high-speed recording, quick job turnaround, reliability and low cost.

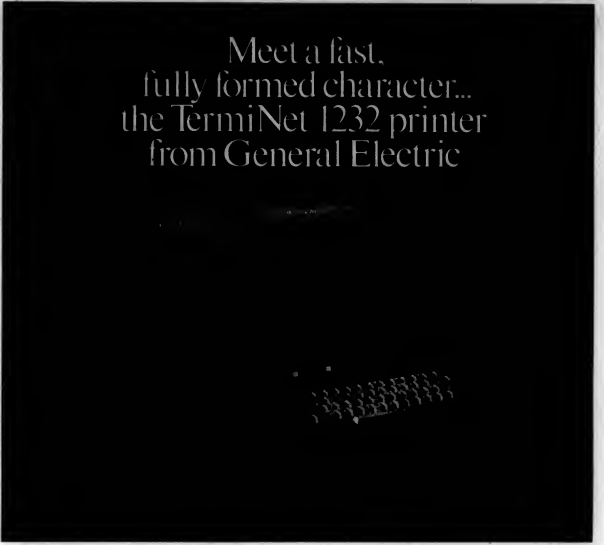
A successful configuration, Ince stated, would most likely be on-line to the CPU and exist within the compter room. It would also incorporate a front-end intelligence and an in-line, immediate film processing system that is completely dry.

Kodak chose a helium-neon-type laser in it's Comstar series for size, cost and safety considerations, Ince added. The firm also developed a high-speed, high-resolution film to makeup for the low power output of that particular type of laser.

3M Co.'s Art Kutchera stated that the future of COM technological developments, either toward CRT-type systems or laser generation, will depend upon what types of film are developed. The laser will dominate the market only if the power output of the CRT fails to meet the needs and restrictions of the film, he said.

(Continued on Page 53)

Lear Siegler CRT's
For Sale
ADM Series
1. 2 & 3
[illegible] 2288



Fast thruput, rugged performance and fully formed characters make the difference in General Electric's new TermiNet 1232 belt printer.

The speed—all 1200 baud of it—comes from a 1000-character input buffer, a 510-character-per-second hammer bank and fully formed individual characters.

The ruggedness—which enables the TermiNet 1232 printer to handle the most demanding data communications workloads with ease—comes from 10 years of developing and producing performance-proven belt printers. It's the kind of experience few companies can match.

Features? The TermiNet 1232 is available with an integrated punched paper tape or magnetic tape option (single or dual). Its Hall-effect keyboard, with n-key rollover, means there are no contacts to wear out. The 94 fully formed upper and lower case ASCII characters result in clear, high print quality—even on 6-part forms. A snap-in ribbon cartridge provides clean, multi-million character printing and also contributes to the printer's ease of operation.

In addition, paper can be loaded from either the front or the back. Sturdy, adjustable 6-pin form-feed tractors can handle any paper width from 3" to 14-7/8".

Service? It's at your fingertips with over 100 locations nationwide, where fully trained GE technicians stand ready to respond to any service need.

We'd like to tell you more about the remarkable TermiNet 1232 printer. For the whole story, write: General Electric Company, TermiNet 794-28C, Waynesboro, VA 22980.

For your special kind of needs— a special kind of printer

GENERAL ELECTRIC

Understanding of DP as Office Aid Lacking

By Tim Scannell
CW Staff

BOSTON — Nearly 70% of those people holding top management positions either don't understand the significance of computerized assistance in the office or they are not satisfied with the systems they already have, according to O.H. Davison, Jr., president of the Zytron Corp.

Changes are occurring so rapidly in the development of new office procedures and communications techniques that people feel threatened by this "future shock" — and subsequently deny the potential proposed interoffice communications methods, Davison said at Micrographics '78, sponsored by the National Micrographics Association (NMA).

Service companies, Davison pointed out, have three distinct duties to their customers. First, they have the responsibility to explore and present new technologies that develop throughout the industry. Second, they must exhibit a "sensitivity to people" and the behavioral problems that might erupt.

Time Consideration

A service firm's third — and perhaps most important — duty is demonstrating a concern for the time involved in converting from paper to micrographic systems from a customers' standpoint. In other words, Davison said, a service company that undertakes the job of revamping an office's communications procedures should be prepared to "work against the clock all the time."

Two particular items will play an integral part in the development of the office of the future: the microcomputer chip and fiber optics, Davison said. Revolutions in the development of the chip will eventually result in "the displacement of the large-scale computer," he predicted.

The continued use of fiber optics in communications will bring "significant" strides in global communications and the evolution of "high-speed, digital, broadband satellite communications by the year 1980," he added.

Davison highlighted two factors that, because of their negative overtones, necessitate the development and utilization of computer-assisted retreival techniques and computer-controlled micrographics. One is the rapid inflation and resulting cost spiral; the second is government's and industry's insistence on companies and individuals keeping accurate records for an extended period of time. Corporations, Davison said, can no longer afford to finance or properly maintain a "sea of paper."

CW At NMA

Future Possibility

Davison illustrated his point by postulating a mythical company in a typical boardroom discussion. The boardroom in this case, however, was called a "communications room," and the "discussion" was interspersed with various charts and figures provided by a computer-controlled micrographics unit.

The officials of the mythical company were able to pinpoint and solve the problem of a drop in sales by comparing information provided by the system.

Through a specialized litigation retrieval system, the company could avoid a costly lawsuit by presenting as evidence a letter stored within the computer-controlled system and called up when needed, Davison theorized.

Finally, Davison stressed the importance of choosing the right vendor to "avoid the impact of technology that is carelessly planned by someone else." Drawing on the theme of the conference exhibition — "Building Information Bridges" — he said it is vital that service companies and vendors "build bridges of understanding to the people" who are uneasy about having information and records stored "out of sight" in a computer.

Book Has Details On Data Entry

SANTA ANA, Calif. — A handbook for data entry supervisors and DP managers that is said to answer daily questions about managing a data entry operation is available from *Data Entry Digest*.

The 275-page guide includes sections on operator selection, training techniques, compensation plans, management techniques, supervisory skills and productivity techniques.

Also covered are selection of key-to-disk systems and terminals, how to get more out of a key-to-disk system, distributed processing, user interviews and a review of new equipment.

Material in the "Data Entry Problem Solver" has, in many cases, been provided by users, helping to keep the information practical rather than theoretical, according to a spokesman.

The handbook costs $86 from *Data Entry Digest*, 10522 Ridgeway Drive, Santa Ana, Calif. 92705.

Correction

The Rocky Mountain Bank Note Co. has only one plant that uses the Mohawk Data Sciences Corp. key-to-disk system that was described in the Special Report on source data entry [CW, April 24].

Remote Job En
Information w

Your total RJE processing solution supported

Capability. RJE systems can be configured to satisfy a variety of processing requirements–simple or complex–encompassing the full range of RJE peripheral devices. DPF systems can communicate not only with IBM, but with UNIVAC, CDC and others as well.

Reliability. DPF has assembled and integrated field-proven processors and components within a single product family. These devices have been performing successfully for many years and have earned a reputation for reliability and ease of operation.

Flexibility. You won't be stuck with today's system if it doesn't solve your needs tomorrow. DPF will structure a lease that affords you the opportunity to change configurations as often as required, and stay within your budget constraints.

Price-performance. You will be given an opportunity to select the peripheral devices which best service your processing requirements and budget.

- Printers–up to 1500 lpm.
- Card Readers–up to 1000 cpm.
- Tape Drives–800 or 1600 BPI.
- Other peripherals available.

dpf INCORPORATED

To Save Time, Money

COM Systems Described as Programming Tool

By Tim Scannell
CW Staff

BOSTON — When choosing a computer output microfilm (COM) system, a great deal of consideration should be given to the programming staff because a good programmer, in the course of his work, "can turn out a tremendous amount of paper," according to Anne P. Faass, a member of TRW corp.'s Defense and Space Systems Group.

COM units and their relative benefits can be used by a programmer as tools," Faass said, speaking before a group at the National Micrographics Association's (NMA) Micrographics '78 conference here recently. Compiler listings, control reports and system documentation can all be transferred to microfiche, resulting in both time and cost savings as well as increased organization.

CW
At NMA

TRW first considered the merits of COM in 1969, Faass explained, but had to postpone conversion when "the bottom fell out of the space industry in 1970." The company reconsidered computerized micrographics again in 1973 and, after evaluating the expense, the time-saving benefits and the legality of "reduced" data, it came away with positive reactions, Faass said.

The first aspect that was considered, Faass said, was the cost trade-offs. Since the specialized hardware itself couldn't be compared with existing peripherals, the company considered how much money would be saved on the use of computer paper — an item that, although vital, is "controllable," Faass stated.

TRW then carefully evaluated the equipment that was available at the time. This included contacting the various vendors, who demonstrated their products, and visiting installations already using COM systems, Faass continued. The net result was that the company decided to obtain an off-line configuration because "it wasn't feasible, at the time, to put the unit on-line."

Standards Established

Internally, the corporation had to establish certain standards to ensure that all of the micrographic output would be of the same format. This included adhering to a standard size (48X — 6 in. by 4 in.), having a vertical-type pagination, reserving a certain line on the film for the grid number and another for the index and maintaining a standard title format.

COM software was also considered and because of the obvious complexities, it was decided to standardize the parameters as much as possible, Faass stated. Programs were written so that a programmer need only input the report number, name, index location and data location to access a file. TRW also prepared its own manuals based on its particular applications and instructions from the vendor manuals which, Faass added, were much too complex.

A separate time-sharing option added to the COM system allows programmers to input tests via terminals. A programmer wishing to run a test enters a parameter and receives either a validation or an error message. If the parameters are validated, the programmer submits his job, which is entered in a batch mode, and picks up the completed fiche at a central location within two to three hours, Faass explained.

Besides using COM for programming purposes, TRW also uses micrographics in both the payroll and accounts-payable departments, Faass said. Payroll data is recorded on a weekly basis and each clerk has his own set of recorded data. Should an employee inquire about a lost paycheck or error in his check, the fiche is readily available, Faass noted.

Vendor and billing records are placed on fiche as well, but on a biweekly basis, Faass said.

COM Methods Debated at Meet

(Continued from Page 51)

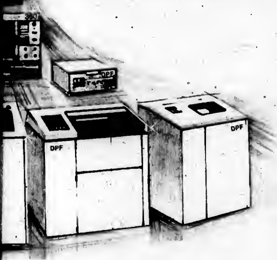
This point was reiterated by Rolf Kahle of the Quantor Corp., who remarked that debating the merits of CRT and laser systems is "of a secondary nature." The COM unit itself, Kahle stated, should be treated as a "blackbox," and a manager's concern should be over the data input and output as well as the cost benefits.

An ideal COM system would provide multiple fonts, flexible character generation, electronic forms overlay, a wide range of films and, of course, a low cost. This type of system can virtually be built today, using a CRT and a dry silver-type film, Kahle said.

Image quality is limited to the type of film used and "it doesn't matter what type of image generator is used — laser or CRT." The laser, therefore, should be treated as just another type of non-impact printer and not the revolution it might be perceived by some to be, Kahle stated.

ry.
en you need it.
Immediately.
y a practical no-risk financial arrangement.

The DPF approach. Tomorrow you may need a larger, more sophisticated system, a system with the ability to go beyond RJE requirements. Our years of total processing experience has enabled DPF to develop a leasing policy to give the data processing professional the hardware and financial flexibility needed to keep up with increasing demands. This ideal combination of technical and fiscal expertise offers the only single-source solution–with IBM and IBM compatible hardware and software capability–to the problem of trying to select from the multitudes of system approaches on the market today.



DPF, a Fortune 500 company, is the largest independent computer leasing company in the country with a computer portfolio in excess of $450 million, at original cost.

I'm interested in hearing more about the DPF approach to RJE.
☐ Please have your representative contact me.
☐ Please send me a brochure and more information.
Name________
Title ________
Phone Number/Ext.________
Company ________
Address ________
City ________ State/Zip ________
For immediate information call: (914) 428-5000
Or send coupon to: RJE
DPF incorporated
141 Central Park Ave., S.
Hartsdale, New York 10530

You are invited to The Annual Computer Leasing Workshop for Computer Users

"An Understanding of Today's Computer Leasing Complexities Plus a Look at Tomorrow's Opportunities"

Boston-June 1st
Washington, D.C.-June 6th

HOSTED BY
Mordecai Weissman, President
Myron S. Goodman, Executive Vice President

OTHER SEMINARS
- St. Louis-June 14th
- Dallas-June 15th
- Minneapolis-June 21st
- Detroit-June 22nd
- Seattle-July 12th
- Denver-July 19th
- Houston-July 20th
- Pittsburgh-July 25th

R.S.V.P. Ms. Ofelia Loret de Mola: 1-800-221-2674, 1-212-747-0220

OPM THE CUSTOM LEASING PEOPLE

O.P.M. Leasing Services, Inc.
71 Broadway, New York, N.Y. 10006

Mini Bits

Standard Logic Floppy Compatible With Novas

SANTA ANA, Calif. — Standard Logic, Inc. has introduced a self-contained floppy disk system that is reportedly hardware-, software- and media-compatible with Data General Corp.'s Nova series.

The FD-8200T comes in single- or dual-drive configurations and with single- or dual-sided drive mechanisms, Standard Logic officials said.

An expansion chassis allows users to implement as many as four single-sided drive units per controller, the company spokesmen added.

Available in rack-mount or tabletop assemblies, all FD-8200Ts reportedly come with power supply, I/O cables and enclosure with LED status display.

In a dual-drive configuration, the floppy disk system costs $3,500 from Standard Logic's General Logic, Inc. subsidiary at 2215 S. Standard Ave., Santa Ana, Calif. 92707.

Series/1 Tape System Described

ANAHEIM, Calif. — A color brochure from Datum, Inc.'s Peripheral Products Division describes Datum's 5191/Series/1 magnetic tape system.

Entitled "Tape Systems for IBM Series/1," the brochure also outlines the firm's Universal User's Adapter, which reportedly allows the Series/Model 3 or 5 to perform functions like initial program load, parity generation and detection of I/O bus during controller operations, and poll sequencing and propagation.

The booklet, which further discusses computer interfacing techniques and software capabilities, is available from Datum at 1363 S. State College Blvd., Anaheim, Calif. 92806.

Philips Has Visual I Brochures

WOODBURY, N.Y. — A set of four 4-page brochures describing the Philips Business Systems Visual I is available from the company's Data Systems Division.

The free color literature describes the level-entry small business system itself and three of its basic accounting functions: invoicing, accounts payable and inventory management, Philips said.

Besides discussing the system's CPU and Software, the brochures describe its display and input unit.

Philips Business Systems' Data Systems Division is located at 175 Froehlich Farm Blvd., Woodbury, N.Y. 11797.

System 34 Additions Yield Magazine, Added Drives

By **Jeffry Beeler**
CW Staff

ATLANTA — IBM has introduced two enhancements to its System 34.

One of the enhancements consists of two disk drive units that reportedly boost by almost fivefold the maximum disk storage capacity available to System 34 users. The other addition — a diskette magazine drive — replaces the Diskette 1 or Diskette 2D units previously announced for the IBM system.

The two additional disk drive units are said to come in single- and dual-spindle versions that store 63.9M bytes and 128.4M bytes, respectively. The System 34's largest previous disk drive unit held 27.1M bytes, an IBM spokesman said.

Both models also access data in an average of 27 msec and transfer more than 1M byte/sec, compared to 38 msec and 889 byte/sec for their largest System 34 predecessor, he added.

IBM declined to identify the two drive units' recording technology or to specify their recording density, the number of recording tracks and the number of sector/track — information it called proprietary. But the company did reveal that the products record 256 byte/sector with 180K byte/logical cylinder and 9-msec cylinder-to-cylinder access.

IBM System 34 Diskette Magazine

The diskette magazine drive, meanwhile, reportedly incorporates five slots that are supported as part of a sequential save/-restore device.

Two of the slots hold a magazine, which in turn contains up to 10 diskettes, the IBM spokesman explained. The three remaining slots store individual diskettes, he added.

In operation, the magazine drive unit begins writing on the first diskette in the first magazine and then repeats the process with each succeeding recording medium until it exhausts the contents of both magazines, the

(Continued on Page 65)

DG 16-Bit, Single-Board CPU Mixes Mini, Micro Features

By **Jeffry Beeler**
CW Staff

WESTBORO, Mass. — Minicomputer capabilities and microcomputer packaging are reportedly combined in a 16-bit single-board computer introduced recently by Data General Corp.

MBC/1 provides an expansion path for users who seek upgrade their 8-bit single-board computers but have been unable to do so because of performance limitations or packaging constraints, a DG spokesman said.

With the addition of asynchronous interface boards and random-access memory (RAM) boards, one 7.5-in. by 9.5-in. MBC/1 can support memory and peripheral attachments that otherwise would necessitate as many as five 8-bit single-board computers, he explained. The 16-bit unit thus reportedly suits applications in which users must minimize CPU chassis space.

Compatible with DG's Micronova product line as well as with its Nova 3 mini, the MBC/1 is said to incorporate a 16-bit Micronova 601 CPU, 2K-byte static RAM, sockets for up to 4K bytes of programmable read-only memory (Prom), an asynchronous communications interface and a 32-line digital I/O port.

The CPU comes with a hardware stack and frame pointer, 16-bit hardware mutliply/-divide, RAM refresh, direct memory access channel, real-time clock and 16-level priority interrupt, the spokesman said.

The asynchronous interface permits full-duplex communications at 110- to 9,600 bit/sec through either a 20 mA current loop

(Continued on Page 56)

Single-Board MBC/1

DRS: The real-world data retrieval system.

DRS works for users because it was developed by users. Four simple commands fetch all the data occasional users want; 76 additional commands let sophisticated users probe, pry, massage, and create. And it's very kind to your core: occupying only 80K bytes on a DEC PDP-11; 256K bytes on an IBM 360/370. Small wonder that over 100 organizations large and small use DRS. And love it. Get the details. Call SONCO at 215-667-7670 or use the coupon.

SONCO INC., 146 Montgomery Ave., Bala Cynwyd, PA 19004
I have a ☐ DEC PDP-11 ☐ IBM 360 ☐ IBM 370
My operating system is__________
NAME__________ TITLE__________
COMPANY__________
ADDRESS__________
CITY__________ STATE__________ ZIP__________
PHONE__________

Double-Sided Floppies Join Micropolis Line

CANOGA PARK, Calif. — Micropolis Corp. has expanded its line of 5.25-in. floppy disk subsystems with what the company said are its first double-sided drive units.

With the announcement, the firm has reportedly extended its single-drive 1015 series subsystems from two to four members. Previously consisting only of single-sided models with 35 or 77 track/surface, the 1015 family now boasts two additional members, both with double-sided storage capability, a Micropolis spokesman said.

At the same time, the company has introduced a double-sided version of its Model 1055 subsystem, a dual-drive product that previously was only available with one recording surface, the officials added.

Intended for large-volume OEMs that integrate floppy disk storage into their own system enclosures, the two unpackaged additions to the 1015 line are said to store 287K bytes and 630K bytes, compared with 143K bytes and 315K bytes for their single-sided predecessors.

The double-sided member of the 1055 family, meanwhile, holds more than 1.89M bytes, compared with 946K bytes for its single-sided counterpart, the spokesman said. Unlike the 1015 family members, both the single- and double-sided versions of the 1055 line are packaged subsystems for low-volume OEMs that add volume to their hardware through software and specialized services, the source explained.

Both additions to the 1015 family are said to offer hard sectoring with 16 sector/track, 256 byte/sector and 75-msec head load. They also transfer 250 bit/sec and access in 30-msec track-to-track with 10-msec settling, the spokesman said.

Optional Intelligent Controller

Moreover, an optional intelligent controller can expand the 1015 family's file space to 946K bytes, the officials added.

But Model III records 5,162 bit/in. and offers 35 recording tracks with 48 track/in., while Model IV records 5,248 bit/in. and offers 77 recording tracks with 100 track/in., the spokesman reported.

The latest member of the 1055 series, meanwhile, reportedly offers soft sectoring with 75-msec head load and 100-msec average rotational latency. It also accesses in 30 msec track-to-track with 10-msec settling, transfers 32K byte/sec in buffered mode and records 6,380 bit/in. with 77 tracks and 100 track/in., the firm added.

With an add-on module sharing a common controller, users can expand the double-sided 1055 subsystem's storage capacity to more than 3.78M bytes, Micropolis officials said. Moreover, users can daisy-chain up to four of the double-sided 1055s, each with an add-on module, to further boost file storage to more than 15M bytes, the officials added.

A 1015 Model III subsystem with 287K bytes of formatted storage and a 1015 Model IV with 946K bytes of formatted storage cost $330 and $396 respectively, in quantities of 500. The double-sided 1055 series subsystem with 1.89M bytes of formatted storage costs $1,796 in quantities of 50.

Micropolis is located at 7950 Deering Ave., Canoga Park, Calif. 91304.

Our new MegaFloppy family of disk drives zeroes in on the needs of both large and small quantity OEMs. These 5¼-inch floppies offer the capacity you'd expect only from 8-inch diskette drives, at 5¼-inch prices.

Our 1015 MegaFloppy lets large OEMs incorporate it right into their system. Select from the 1015 MegaFloppy Mod I and Mod III 35-track models. Or the Mod II and Mod IV 77-track models. They're double density single drives available with single or dual heads and capacities up to 946K bytes of formatted storage per drive, when used with the Micropolis Intelligent Controller.™ You can also daisy-chain up to four 1015 MegaFloppy drives—for a staggering total capacity of approximately four megabytes on-line.

Or you can choose from our 1055 MegaFloppy complete system packages for small quantity OEMs. The 1055 MegaFloppy Mod II and Mod IV are 77-track, dual drive models—featuring the Integrated Micropolis Intelligent Controller.

The Controller uses a simple, bi-directional interface, so an 8-10 chip personality card is all you need for attachment to a variety of 8 or 16-bit hosts.

It performs data formatting, encoding and decoding. Sector buffering. Error detection and recovery. Provides versatile user commands. And interfaces easily with the host system.

So, if your size and price needs call for a 5¼-inch disk drive system, write to us about our million-byte MegaFloppy family.

Just one more first from the citizens of Micropolis.

MICROPOLIS™
More bytes in store for you.

For a descriptive brochure, in the U.S. call or write Micropolis Corporation, 7959 Deering Avenue, Canoga Park, California 91304. Phone (213) 703-1121. Or, better yet, see your local distributor.

The citizens of Micropolis introduce the MegaFloppy.™

The first 5¼-inch floppy that gives you 1 million bytes.

"See us at NCC booth #4443"

DG Introduces 16-Bit Board

(Continued from Page 55)

or RS-232C line, the spokesman noted. Line speeds, data bits, stop bits and parity are reportedly jumper-selectable.

The digital I/O interface, meanwhile, provides 16 input lines, an equal number of output lines, data strobe and an external interrupt line, company officials said.

To these interfaces, users can attach an assortment of the firm's Dasher printers or display terminals to form dedicated control systems for applications in instrumentation, communications, data acquisition and industrial automation, DG sources explained. The MBC/1 also reportedly provides an extended memory bus that allows users to connect up to 64K bytes of add-on RAM or Prom.

By itself, moreover, the single-board can provide a data link between remote devices and any large DG CPU serving as a host processor in a distributed control network, the spokesman added.

Most customers for the MBC/1 will be either "sophisticated" end users or OEMs that will buy the product in quantities of 25 to 500, officials predicted.

Software for the single-board computer reportedly includes a multitasking support package that provides an emulator for program development under DG's Advanced Operating System, Disk Operating System and Real-Time Disk Operating System. The software package also includes a monitor for program execution on the MBC/1, spokesmen reported.

Options are said to include self-test diagnostics and an on-board console debug facility, both of which permit software development on larger DG minicomputer systems.

In quantities of one and 50, the MBC/1 costs $725 and $500, respectively, while the optional console debug and self-diagnostic capability sell for $90 each. DG is located at Route 9, Westboro, Mass. 01581.

The kind of person who wants our kind of future.

OUR SUCCESS IS THE SUCCESS OF OUR PEOPLE.

Amdahl was founded by a bright and dedicated cadre of people, bound together by the opportunity and challenge to rethink large-systems technology, performance, reliability, serviceability and support. In a relatively short time, innovative thinking and performance have made Amdahl a major contender in the large-systems market. With a solid basis for continuing growth.

As Amdahl grows, more of the kind of people who made the company what it is today are needed.

People with a trailblazing spirit.

People who get involved. With their work. With each other. With ideas.

That's the kind of person who's good for Amdahl.

Today.

And tomorrow.

STATE OF THE ART IS A STATE OF MIND AT AMDAHL.

At Amdahl, the kind of thinking that went into advanced technology and architecture pervades most everything the company does.

That's why Amdahl produces the most advanced family of general-purpose computers. And why Amdahl has the most respected support and service organization in the industry.

Amdahl customer support teams don't just support Amdahl systems but, in fact, offer assistance to aid in diagnosing any hardware or software problems in the customer's environment. Regardless of the origin of the problems.

This total systems support philosophy, along with the unique remote diagnostic techniques afforded by the Amdahl Diagnostics Assistance Center (AMDAC), results in customer systems that deliver exceptional levels of availability. And, of equal importance, greater job satisfaction and professional growth for the Amdahl support and service people.

Wherever you work at Amdahl, you'll be among some of the best people in your field. And you'll find them just as involved and enthusiastic as you are.

Amdahl wouldn't want it any other way.

PEOPLE WHO DON'T GROW, SOON GROW BORED.

Talented people often feel their careers have reached an endless plateau. Or find their talents wasted on a slow track in a large, rigidly structured organization.

From the beginning, Amdahl has recognized the need to provide an effective means for personal and professional growth.

By creating an environment in which the efforts of the individual are recognized and rewarded.

And with the kind of commitment to employee compensation, benefits and continuing education that promotes continued satisfaction of the individual.

In 1977 the size of our staff more than doubled. So did our revenues and operating income. That kind of growth creates continuing opportunities for advancement.

Not just in management. But everywhere, including the hands-on state-of-the-art technical environment.

Amdahl's determination to maintain technological leadership doesn't leave Amdahl people much of a chance to grow bored.

That's good for Amdahl.

And good for people, too.

WE WORK HARD FOR YOUR IDEAS.

Bright ideas are valuable at Amdahl.

So Amdahl does everything it can to encourage you to have them.

By allowing you room to make discoveries and explore your talents.

By recognizing your achievements. And by rewarding your efforts well.

The more Amdahl grows, the harder Amdahl works to keep its people involved. Thinking. Creating. Talking to each other.

Everywhere at Amdahl.

So your ideas have a better chance to be heard.

After all, if Amdahl didn't understand the importance of a new idea, Amdahl wouldn't be where it is today.

WE NEED YOU WHEREVER YOU ARE.

If you're good at what you do, there's a good chance that Amdahl needs you. Right now.

And not just at California headquarters.

Amdahl needs good people in many areas of the country. Perhaps not far from where you live.

So if you're looking for a greater degree of professional freedom and a chance to upgrade your career, Amdahl would like to hear from you.

Wherever you are.

First Class
Permit No.741
Sunnyvale
California

BUSINESS REPLY MAIL
No postage necessary if mailed in the United States

Postage will be paid by

Amdahl Corporation
1250 E. Arques Ave.
Sunnyvale, CA 94086

amdahl

If you're interested, we're interested.

If you'd like to rethink your future, fill out this easy application and send it to Amdahl today. In strict confidence. With no commitment.

Amdahl would like to know about you.

And would like to let you know more about Amdahl. About specific opportunities that might be of interest to you.

You see, Amdahl thinks you're a valuable asset.

To yourself.

And maybe to Amdahl, too.

PERSONAL

NAME: Please PRINT or TYPE Last Name, First Initial and Middle Initial	HOME TELEPHONE NO.
ADDRESS: Street Number and Name, City, State, Zip Code	Message/Business No. + Ext.

POSITION DESIRED

Type of POSITION Desired:	Date Available
Geographic Preference	Salary Desired $

EDUCATION and TRAINING

	HIGH SCHOOL				COLLEGE or UNIVERSITY				GRADUATE SCHOOL		
Indicate Last Level of Education Completed	☐ 9	☐ 10	☐ 11	☐ 12	☐ 1	☐ 2	☐ 3	☐ 4	☐ 1	☐ 2	☐

NAME of SCHOOL High School and College	LOCATION City and State	MAJOR	DEGREE

EMPLOYMENT HISTORY (Please feel free to send us a resume or letter if you like.)

PRESENT EMPLOYER	Employment Dates
	From To
Description of Duties	Position

PREVIOUS EMPLOYER	Employment Dates
	From To
Description of Duties	Position

PREVIOUS EMPLOYER	Employment Dates
	From To
Description of Duties	Position

It's easy . . . tear out application, fold in thirds, staple and mail. And, your reply is in strict confidence.

Equal Opportunity Through Affirmative Action

Mark your calendar now! Be there when the computer industry's most dynamic show comes near you!

The Computer Caravan's

COMPUTER 78

You're invited to see the latest and the best in:

Data Communications Terminals • Software • Minicomputers • Data Input Equipment • Computer Output Equipment • Supplies • Magnetic Media • Modems • DP Education • Small Business Computer Systems • Flexible Disk Drives • Data Communications Interconnect Equipment • Mini-peripherals • Magnetic Tape Transports • Cassette Systems • Power Supplies • Printer Terminals • Keyboards. And more.

Here are the companies who will be looking for you:

NCR
Varian Graphics
Informatics
Honeywell
Datamation
Communication News
McCormack & Dodge
Data Rentals
Computer Sales International
Intel
Electronic Ventures
Computer Roomers
Customer Priorities
Computer Software Solutions
Systems Marketing
S.E.A
Tri Data
Midwest Marketing
Logabax
AAA Chicago Computer
Intelligent Systems
Shasta
Mostek
DIVA
SBC Magazine
Tele-dynamics
Control Data
National Semiconductor
Printronix
Codex
Lear-Siegler
E M & M
The Morley Company
Vanier Graphics
Total Typography
Wang Labs
Computer Devices
Ann Arbor Terminals
Datapro Research
Intorex
Perkin-Elmer
Telcon Industries
Versatec
Computer Performance
Advanced Systems
Delta Data Systems
Informer
Computer Decisions
Infosystems
T Bar
Corporate Systems
YE Data
Arcus
St Louis Info
Computerworld
NCI
AT&T
Kodak
BASF
IBM
Anderson Jacobson
Computer Input Services
Paradyne
ComData
Genesis One
Data Processing Sciences
Applied Computer Systems
Agile
Woodford Systems
American Used Computer
Business Forms Service
Itel Corporation
Deltak
Peripheral Products
General DataComm Industries
Continental Peripherals
Computer Associates
Qantel
Diablo Systems
Marketechs
Racal-Milgo
Data Systems Specialists
Key Tronic
Administrative Management
Small Systems World
American Terminal Leasing
Journal Systems Management
Optical Business Machines
McGunn Safe
Allstate Computer
H/G Professional Forms
Nichols & Company
Datapro
Input Services
Plessey Services
Industrial Computer Controls
Vincent Data Products
World Info Systems
DP Power
Conrac
Educational Data Systems
Cybertek
Cosmic
Business Automation
Insyte Datacomm
Herrera Kirby
Foto fun
Hamilton Sorter
Trac Associates
Sperry Univac
Xerox
Sykes Datatronics
Cummins Allison
American Microprocessor
International Data Corp
Programs, Inc
Beehive International
Intertec Data Systems
Software AG
Creative Engineering
Graphic Controls
Mini Computer Systems
Tandem Computer
PCC/Pertec
Computrend
Extel
Mentel
Sycor
Digitronics
Computer Services
Datamart
Courier Terminals
Modems Plus
Software Design
Curtis 1000
Spectron
K&K Associates
Applied Digital Data
Epic Data
Terminal Rentals
Applied Data Communications
Data Forms Company
Imperial Technology
Mathematica
Rianda Electronics
Computer Corp of America
Cullinane
Hewlett Packard
Pansophic Systems
Dynatech
Western Union
Calcomp
General Computer
Atlantic Research
Teletile Computer Products
General Electric
Qume
Moore Business Forms
DataMedia
Texas Instruments
Consolidated Computer
Cybersearch

Here's the schedule:

DETROIT	May 23, 24, 25
Great Lakes Computer Expo	Cobo Hall
BOSTON	May 30, 31, June 1
New England Computer Expo	Northeast Trade Center

Show hours:
10AM to 5PM

No advance registration required. An exhibitor guest ticket or your business card will admit you.

COMPUTER 78

THE COMPUTER CARAVAN'S

The Computer Expo is produced by the Caravan Division of the Conference Company, 60 Austin St., Newton, MA 02160 (617) 964-4550

When it comes to the versatility that best serves your needs, our Infoton 400 Data Display Terminal has about as much as you could ask for. Probably more. Designed around the Z-80 microprocessor, it has editing and formatting capabilities in modes settable through software. And at $1,095 in quantities of 100 or more, its flexibility is unmatched for the price by any other terminal in the business. If your needs include options, we can serve you two additional pages of memory, a directly addressable printer interface, as well as polling capabilities.

To ask how far we'll go to serve your video terminal needs, call Infoton toll-free at (800) 225-3337 or 225-3338. Ask for Barbara Worth. Or write Barbara Worth at Infoton, Second Avenue, Burlington, MA 01803.

Prepared by Chickering/Howell Advertising, Los Angeles

Infoton 400

Multiplexer Board Saves Three I/O Interface Slots

MINNEAPOLIS — An I/O multiplexer board offered by Custom Systems, Inc. reportedly does the work of four controller interface boards in Data General Corp. Eclipse and Nova minicomputers and their replacements.

As a result, the 15-in. by 15-in. board saves three I/O slots that otherwise would be occupied in the chassis of those minicomputers, a Custom Systems official said. With the extra space, users can expand their systems' memory or reduce the size of their CPUs' chassis, the official explained.

Slot Saver II is said to hold all the control logic needed to connect Data General Corp. CPUs and systems that emulate them to the following peripherals and devices:

- Four serial asynchronous peripherals.
- A real-time clock.
- A CRT terminal or teletypewriter.
- A line printer.

The board's serial peripheral controller provides interface logic for console terminals with device code 10/11, the Custom Systems sources said. With the controller, transmissions from 110 bit/sec to 19,200 bit/sec and RS-232 or current loop interface are jumper-selectable, the spokesman added.

The controller also provides an asynchronous serial port for a second system console with device code 50/51, he added.

The programmable real-time clock controller, meanwhile, is said to provide frequencies of 10 Hz, 50- or 60 Hz, 100 Hz and 1,000 Hz.

Like the serial peripheral controller, the four-channel asynchronous multiplexer controller permits jumper-selectable transmissions of 110- to 19,200 bit/sec and current loop or RS-232 interfacing, the official said. Users can reportedly expand the controller to accept as many as 64 terminals.

The parallel line printer controller is said to come with a standard 20-ft cable and to interface models from Centronics Data Computer Corp., Data Products Corp., Printronix, Inc., General Electric Co., Control Data Corp. and others.

Options include a 19-in. RS-232 connector panel for six serial terminals and a modem controller for remote terminal support, the Custom Systems spokesman added.

Slot Saver II is reportedly compatible with instruction sets and operating systems for Data General-compatible peripherals. The peripheral drivers in the Assembler or Real-Time Disk Operating System need no modification to operate with the multiplexer board, the spokesman noted.

With cables, documentation and supporting software, the product costs $1,800 from Custom Systems, 2415 Annapolis Lane, Minneapolis, Minn. 55441.

Mini Selection, DDP Use Slated as Seminar Topics

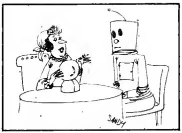
CHICAGO — "Minicomputers and Distributed Processing," a three-day seminar sponsored by the University of Chicago's Center for Continuing Education, will reportedly tell corporate managers how to evaluate minicomputer hardware and software and how to select systems that best meet their companies' business needs.

The seminar, scheduled to take place June 21-23 in San Francisco and July 19-21 in Washington, D.C., will also explain how minis can extend, replace and support central computing facilities, a conference organizer said.

Under the direction of seminar leader George R. Trimble Jr., president of T-Logic, Inc., the conference program will cover such topics as minicomputer architecture, peripherals, minicomputer software, microprocessors, distributed DP (DDP), communications support for distributed networks, applications-oriented systems, intelligent terminals and small business systems.

Tuition is $495 per attendee plus $65 per company.

Registration forms and additional information are available from the University of Chicago, Center for Continuing Education, 1307 E. 60th St., Chicago, Ill. 60637.



'Soon You Will Meet a Tall, Dark Computer . . .'

CURE
MINI-FRUSTRATION!
join AMU
association of minicomputer users

215 Oak Street
Natick, MA 01760
(617) 655-2289
amu

Powerful new way to write interactive data entry programs:

ITEMS™

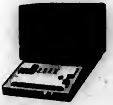
ITEMS software — the INCOTERM Transaction Entry Management System — is a virtual storage operating system for distributed data processing. A powerful software development tool that can dramatically reduce the time required to create and implement versatile application programs.

ITEMS software gives the system designer such operating advantages as extensive local editing, local screen format and data storage, local data entry control, interactive and stand-alone processing options, as well as security procedures. Implementation is greatly simplified. Mainframe application programs continue without workflow interruption.

User experience shows that 20% to 30% of all interactively entered data results in error. ITEMS software offers an efficient solution to this costly problem while enhancing data entry throughput and reducing mainframe overhead. ITEMS software operates on standard INCOTERM Series 30 or Series 40 Intelligent Terminals with diskette or rigid disk storage. Up to eight display stations and eight printers can be operated independently under sixteen concurrent programs. Operators are guided by editing attributes for each input field; 25th line messages prompt accurate keying.

Why not discover how you can use the full power of ITEMS software on your existing network without extensive conversion procedures. Call or write for complete details.

More power to your terminal.



INCOTERM® CORPORATION
A Subsidiary of Honeywell Inc.
65 Walnut Street, Wellesley Hills, Massachusetts 02181
Telephone: (617) 237-2100

TC-16 Gets Drives, Controller

CUPERTINO, Calif. — Tandem Computers, Inc. has announced three dual-port disk drive subsystems and a dual-port disk controller for its TC-16 Nonstop system.

The three subsystems include the 200M-byte Model T16/4103, the 300M-byte Model T16/4104 and the 80M-byte T16/4105.

Equipped with voice-coil linear dc motors and on-track servo mechanisms, the disk drive units access in an average of 28 msec with an average latency of 8.35 msec, a company official said.

All three models provide TTL and ECL logic circuits, he added.

The models 4104 and 4105 transfer data at a speed of 1.2M byte/sec and use SMD technology to provide 240M bytes and 64M bytes of formatted storage, respectively, the spokesman noted.

The Model 4103, by contrast, transfers at 806K byte/-sec and uses IBM 3330 technology to record 160M bytes of formatted data on 3336-11-type disk packs, the company added.

The T16/3105 controller, meanwhile, is said to support mixed disk drive configurations and to provide dual-recording capabilities, which permit users to transfer buffered records to one or more disk drives without reusing an I/O channel.

Equipped with 4K logical record buffers between the I/O channels and the disk units, the controller also reads without I/O transfer — a capability that allows users to duplicate disk storage without using an I/O bus, the official explained.

Removable plugs in the three disk drive subsystems permit users to make logic address changes, he said.

The models 4103, 4104 and 4105 cost $24,500, $31,500 and $15,500, respectively. The 3105 controller sells for $10,500. Tandem Computers is located at 19333 Vallco Parkway, Cupertino, Calif. 95014.

AMU Seminar To Cover DDP

BOSTON — What is the state of the art in connected computer systems? What distributed data processing (DDP) products do hardware vendors offer and what are their DDP strategies?

The Association of Minicomputer Users (AMU) will try to answer these and similar questions at a three-day applications seminar entitled "Minicomputers in Distributed Computing."

Slated to take place here June 21-23, the seminar will be conducted by two AMU members who will supervise "interactive" sessions reviewing case histories of distributed networks and strategies.

The seminar's $365 registration fee ($420 for non-AMU members) covers the cost of seminar notes. Additional program and price information is available from the AMU at 215 Oak St., Natick, Mass. 01760.

Tester Works Off-Line

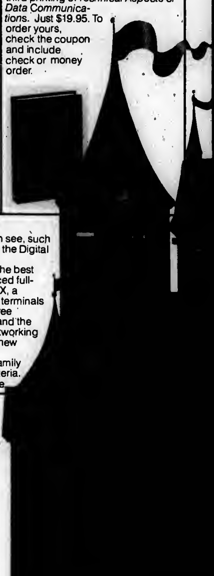
JESSUP, Md. — A magnetic tape drive maintenance aid introduced here recently by Digi-Data Corp. reportedly allows users to perform off-line troubleshooting without interrupting other system functions.

The DEMC-3 card exercises the logic circuitry of a formatter and as many as four 7- or 9-track transports, a spokesman explained.

The unit accommodates all of the company's NRZI, phase-encoded and dual tape drive systems without customer I/O interfacing, the official added.

Selectable functions available with the DEMC-3 are said to permit forward or reverse reading and writing.

Priced at $400, the DEMC-3 is available from Digi-Data at 8580 Dorsey Run Road, Jessup, Md. 20794.



DIGITAL, MAY, 1978.

CATCHING THE ANSI STANDARD MUMPS.

MUMPS, the interactive data base management system was pioneered at Massachusetts General Hospital in 1967. Digital has been in the forefront of its development ever since. Now Digital announces DSM-11, the first implementation of ANSI STANDARD MUMPS language to become available from a major computer manufacturer. Unique features of DSM-11 include journaling, spooling, distributed data base support, support for up to sixty-three jobs and eighty terminals, and data base capacity from 7.5 million to 1.4 billion bytes. To find out how to get MUMPS, check the coupon.

THE ULTIMATE DISTRIBUTED PROCESSING DEMONSTRATION. DECNET. LIVE AT NCC.

A 36-bit DECSYSTEM-2020 running the TOPS 20 operating system will be hooked up to a 32-bit VAX-11/780 running the VMS virtual memory system and these will be hooked up to a 16-bit PDP-11/34 running RSX-11. If you ever wanted concrete proof of DECnet's ability to link together different architectures, word lengths, and operating systems, come to Anaheim, June 5, and join the crowd in the West Hall. And if you want to read about why such acrobatic networking can be vitally important to you, check the coupon. (The secret is matching the computer to the job!)

TECHNICAL ASPECTS OF DATA COMMUNICATIONS NOW IN ITS THIRD PRINTING.

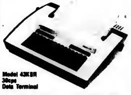
The Digital Press announces the third printing of *Technical Aspects of Data Communications*. Just $19.95. To order yours, check the coupon and include check or money order.

DIGITAL BRINGS ITS OWN TOMORROWLAND TO NCC AT ANAHEIM.

The National Computer Conference has never seen, and may never again see, such an array of major new products from a single company as will be on display at the Digital Booth June 5 through June 8.

In one corner, the VAX-11/780, rapidly becoming recognized as possibly the best FORTRAN machine ever made. In another, DECSYSTEM-2020, the lowest priced full-capability mainframe in the world. In a third, a PDP-11/70 running the new TRAX, a complete transaction processing system with specially designed block mode terminals that is easy on the user and easy on the pocketbook. And in the last corner, three computers, two of which are important new versions of established favorites, and the third participating in a dramatic demonstration of the new DECnet Phase II networking software. On the systems, the new RK07, the new RM02, and the dramatically new RL01 disk drives, new terminals, and a new tape drive.

And in the middle of the floor, for the first time ever, an entirely new Digital family of products as yet unannounced. Six of them. West Hall, on the way to the cafeteria. And if you can't make Anaheim, check the box. We'll send you a show package



TELETYPES®

New and Reconditioned
Models 28 • 32 • 33 • 35
40 • 43

FEDERAL Communications Corporation
11105 Shady Trail #107
Dallas, Texas 75229 U.S.A.
(214) 620-0644 TELEX 732211

Mini Boasts 20 Times Throughput of 1130

SAN DIEGO — Throughput roughly 20 times greater than that of the IBM 1130 reportedly characterizes a time-sharing minicomputer system introduced here recently by Digital Scientific Corp.

The Model 5020 is said to provide twice the throughput of the company's Meta 4/4000 series processors and to be software-compatible with that earlier line. A Digital Scientific official credited the 5020 with giving users of the Meta 4/4000 series an "avenue of growth into multiuser, multiterminal and multitasking systems."

Users can access all of the 5020's functions while running concurrent jobs and spool output onto attached disk subsystems, company officials said. In this way, the system creates "virtual peripherals" and speed throughput by as much as sixfold, they added.

The Model 5020 represents the first of a series of 16-bit computers Digital Scientific reportedly expects to announce during the coming months. Designated the Meta 4/5000 series, the upcoming systems will range from low-end minis aimed at OEMs to high-end processors comparable in performance to mid-range IBM 370s, company spokesmen said.

Available with 135 basic instructions, the first member of the Meta 4/5000 line provides multiprogramming control for up to 32 job streams including two concurrent card reader punches and 30 terminals, the officials said. This control is said to apply to interactive, batch and remote-batch time-sharing applications.

Peripherals accommodated by the system include standard IBM units like the 1403-N1 line printer, Digital Scientific said. Model 5020 also interfaces tape drives plus 2310, 2311- and 2314-type disk systems, the firm added.

For jobs requiring large storage capacity, the system reportedly accepts up to eight 165M-byte disk drive units.

Communications features available with the system include 4-, 8-, 12- and 16-line asynchronous adapters that transmit up to 19.2k bit/sec, company officials noted. The system also provides adapters for IBM's bisynchronous protocol, they said.

A minimum 5020 configuration reportedly includes 16K bytes of 500-nsec semiconductor or core memory expandable to 128K bytes.

A basic configuration with a 20M-byte disk unit, controller for up to seven additional disks, 600 line/min printer, CRT terminal and 600 card/min card reader costs $73,600. Digital Scientific is located at 11425 Sorrento Valley Road, San Diego, Calif. 92121.

System 34 Gets Drives, Magazine

(Continued from Page 55)

official said. In this way, the facility is said to write as many as 24M bytes without operator intervention.

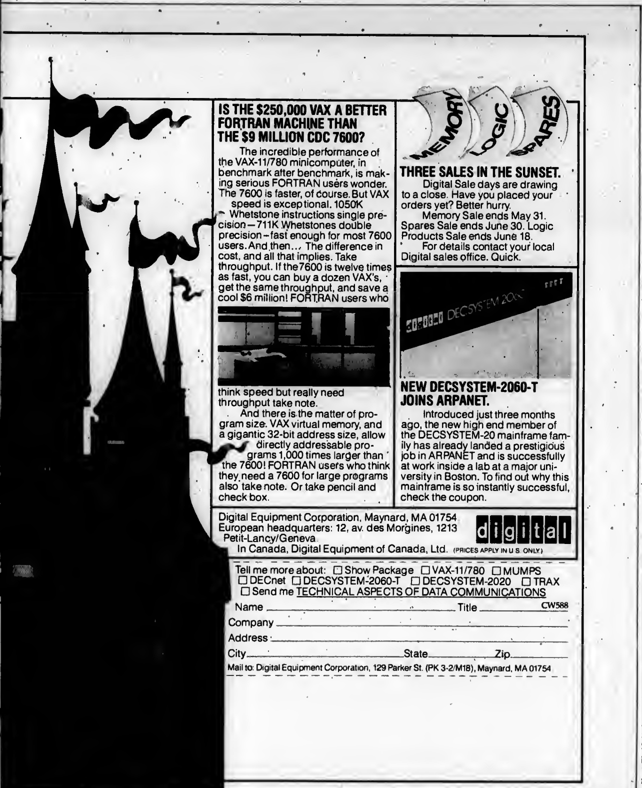
IBM also said the magazine drive unit provides a diskette data transfer rate twice that of, previous System 34 disk products.

For relatively small processing jobs, users can opt for the individual diskettes instead of the magazines, the IBM spokesman said. A System 34 drive unit can process two or three single-slot diskettes without operator intervention, he noted.

No programming changes or recompiling is necessary when user's field-upgrade their existing System 34s to accept the magazine facility and the two additional disk drive units, the official added.

Depending on the System 34 configuration, purchase prices for the 63.9M-byte disk drive unit range from $36,900 to $51,180; rental prices, from $1,130/mo to $1,537/mo; and lease prices, from $1,028/mo to $1,398/mo. A 128.9M-byte storage unit sells for $45,470 to $59,750, rents for $1,410/mo to $1,817/mo and leases for $1,283/mo to $1,653/mo.

Although not sold as standalone modules, a tyical magazine facility adds $4,680 to a System 34 disk drive unit's purchase price. Deliveries of the latest System 34 enhancements are scheduled to begin next January from IBM's General Systems Division, which can be reached at Box C-1645, Atlanta, Ga. 30301.



IS THE $250,000 VAX A BETTER FORTRAN MACHINE THAN THE $9 MILLION CDC 7600?

The incredible performance of the VAX-11/780 minicomputer, in benchmark after benchmark, is making serious FORTRAN users wonder. The 7600 is faster, of course. But VAX speed is exceptional. 1050K Whetstone instructions single precision — 711K Whetstones double precision – fast enough for most 7600 users. And then… The difference in cost, and all that implies. Take throughput. If the 7600 is twelve times as fast, you can buy a dozen VAX's, get the same throughput, and save a cool $6 million! FORTRAN users who think speed but really need throughput take note.

And there is the matter of program size. VAX virtual memory, and a gigantic 32-bit address size, allow directly addressable programs 1,000 times larger than the 7600! FORTRAN users who think they need a 7600 for large programs also take note. Or take pencil and check box.

THREE SALES IN THE SUNSET.

Digital Sale days are drawing to a close. Have you placed your orders yet? Better hurry.

Memory Sale ends May 31. Spares Sale ends June 30. Logic Products Sale ends June 18.

For details contact your local Digital sales office. Quick.

NEW DECSYSTEM-2060-T JOINS ARPANET.

Introduced just three months ago, the new high end member of the DECSYSTEM-20 mainframe family has already landed a prestigious job in ARPANET and is successfully at work inside a lab at a major university in Boston. To find out why this mainframe is so instantly successful, check the coupon.

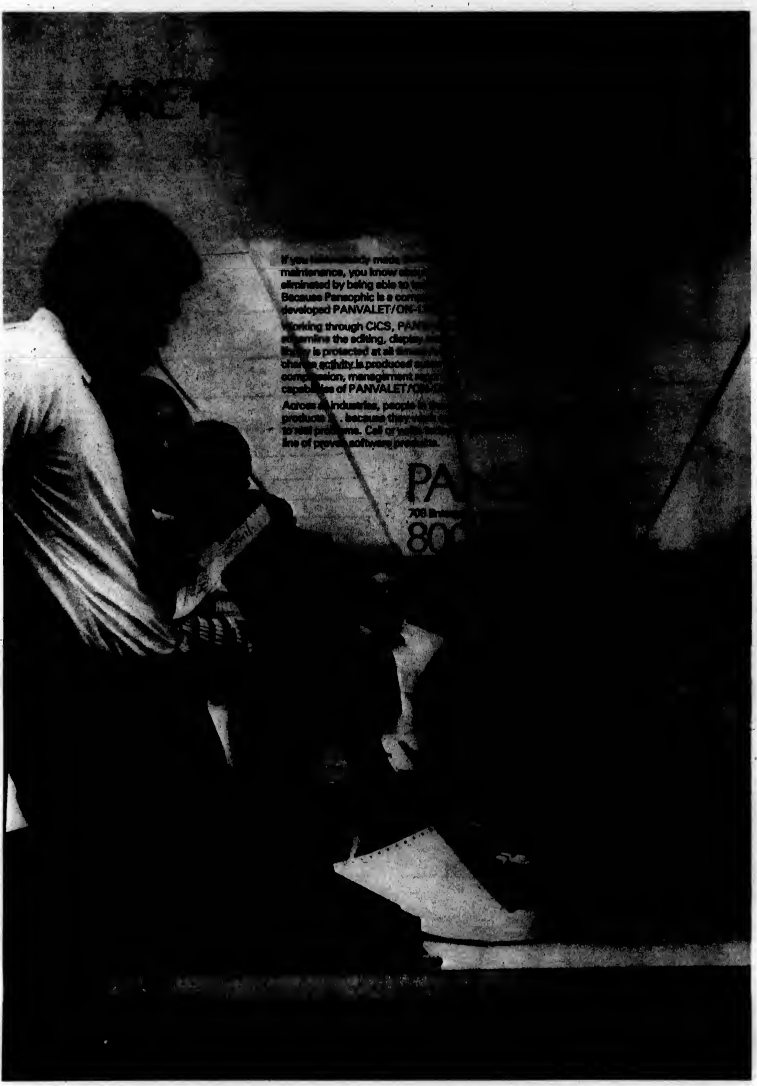
Digital Equipment Corporation, Maynard, MA 01754
European headquarters: 12, av. des Morgines, 1213 Petit-Lancy/Geneva
In Canada, Digital Equipment of Canada, Ltd. (PRICES APPLY IN U.S. ONLY)

digital

Tell me more about: ☐ Show Package ☐ VAX-11/780 ☐ MUMPS ☐ DECnet ☐ DECSYSTEM-2060-T ☐ DECSYSTEM-2020 ☐ TRAX
☐ Send me TECHNICAL ASPECTS OF DATA COMMUNICATIONS

Name ____________ Title ____________ CW588
Company ____________
Address ____________
City ____________ State ____________ Zip ____________

Mail to: Digital Equipment Corporation, 129 Parker St. (PK 3-2/M18), Maynard, MA 01754



If you [illegible] made
maintenance, you know abou
eliminated by being able to te
Because Pansophic is a comp
developed PANVALET/ON-

Working through CICS, PAN
streamline the editing, display
library is protected at all times
change activity is produced
compression, management
capabilities of PANVALET/ON-

Across all industries, people in
products . . . because they want
to real problems. Call or write
line of proven software products.

PA
708 [illegible]
80

Micro Chips

Floppy Controller Uses Motorola 6843 Chip

LAFAYETTE, Ind. — Wintek Corp. has introduced a floppy disk controller it said can interface to any full-size or minifloppy disk drive and support both hard- and soft-sectoring formats.

The controller incorporates the Motorola MCM 6843 floppy disk controller integrated circuit and includes the IBM 3740 or user programmable read/write format. It has automatic cyclic redundancy check (CRC) generation/checking and features programmable step and settling times, Wintek stated.

An assembled controller is priced at $199 from the firm at 902 N. 9th St., Lafayette, Ind. 47904.

Plessey Semiconductors Makes Four-Bit Data Latch Available

IRVINE, Calif. — Plessey Semiconductors has announced a 4-bit data latch incorporating nonvolatile semiconductor memory. The unit was designed as a replacement for latching relays, nonvolatile add-ons to counters, security code storage devices and similar systems.

The MN9102 quad latch uses MNOS memory elements to retain data on the unit's four inputs when power is removed from the circuit, according to a spokesman. When power is reapplied, the stored data is restored to the outputs.

The data is retained for a period of one year over temperature ranges from 0°C to 70°C, the spokesman claimed, adding the unit has an operational lifespan of a minimum of one million write cycles.

The latch is TTL/MOS-compatible and requires operating voltages of +5V and -12V, the firm said.

The MN9102 is available at a 100-piece price of $4.40 from the company at 1641 Kaiser Ave., Irvine, Calif. 92714.

Corrections

In the May 8 "Learner's Lexicon," IBM's Vtam should have been identified as the Virtual Telecommunications Access Method.

In "A Rather Foolish Situation" [CW, April 24], Benwill Publishing Corp. was incorrectly identified as Benwill Publishers, Inc. Further, the claims of International Personal Computer Shows, Inc. center on territory, not show ownership.

Also, last year's Midwest Computing Exposition was incorrectly described as "unsuccessful." The show, by any standards, has to be considered a success. Finally, CW was not endorsing a boycott of the Chicago shows this fall.

Voice Data Input Unit Operates With Apple II

LOS ALTOS, Calif. — Heuristics, Inc. has introduced a voice data input unit compatible with Apple Computer, Inc.'s Apple II microcomputer system.

The Speechlab Model 20A includes a high-fidelity microphone and a user manual with six demonstration programs written in Apple Basic, the firm said. The unit can operate with the Apple II peripheral procedures and user-written programs.

The program to run the unit is contained on an onboard programmable read-only memory (Prom), which is enabled and executed by the microcomputer's monitor program when speech input is desired, allowing that input to be incorporated into the user's present and future programs, a spokesman stated.

The Speechlab 20A features a 32-word vocabulary, the firm added.

Speechlab Voice Input Unit

The unit, with documentation, is priced at $189. An optional headset-mounted noise-canceling microphone for use in noisy environments and for applications that require the use of both hands is available for $85.

Further information can be obtained from the firm at 900 N. San Antonio road, Los Altos, Calif. 94022.

Gnat Micro Has Dual Floppies

SAN DIEGO, Calif. — A microcomputer system introduced by Gnat Computers, Inc. features dual floppy disk drives and 32K of random-access memory (RAM).

The Gnat-Pac System 9 has a disk capacity of 500K bytes optionally expandable to 1M byte, according to a spokesman. Hardware includes an 8080A MPU, a 16K read-only memory (ROM) board with 2K of programmable read-only memory (Prom), an 11-slot motherboard and power supply.

Card rack, radio frequency interchange filter and cabinet are also standard, the firm noted.

Software for the microcomputer includes a monitor; loader; disk operating system with assembler; editor; and dynamic debugger containing track, test and debug functions, the firm stated. Fortran, Basic and other languages are also offered as options.

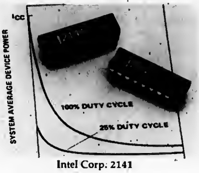
The unit is priced at $5,500 with delivery in 60 days from Gnat Computers, Inc., Unit 6, 7985 Convoy Court, San Diego, Calif. 92111.

Intel Adds Low-Power RAMs

SANTA CLARA, Calif. — Intel Corp. has introduced a series of static random-access memories (RAM) that operate with 40mA of maximum supply current in main, cache, buffer and control store memory applications.

The 2141 family consists of seven RAMs, each available with four different speeds and three low-power selections, according to a spokesman. The units are also TTL-compatible on all inputs and outputs, he added.

The memories employ a chip select input for device selection, allowing either synchronous or asynchronous memory systems to be designed around them, the firm stated. An automatic power-down feature places the memory on standby power when the chip is deselected.



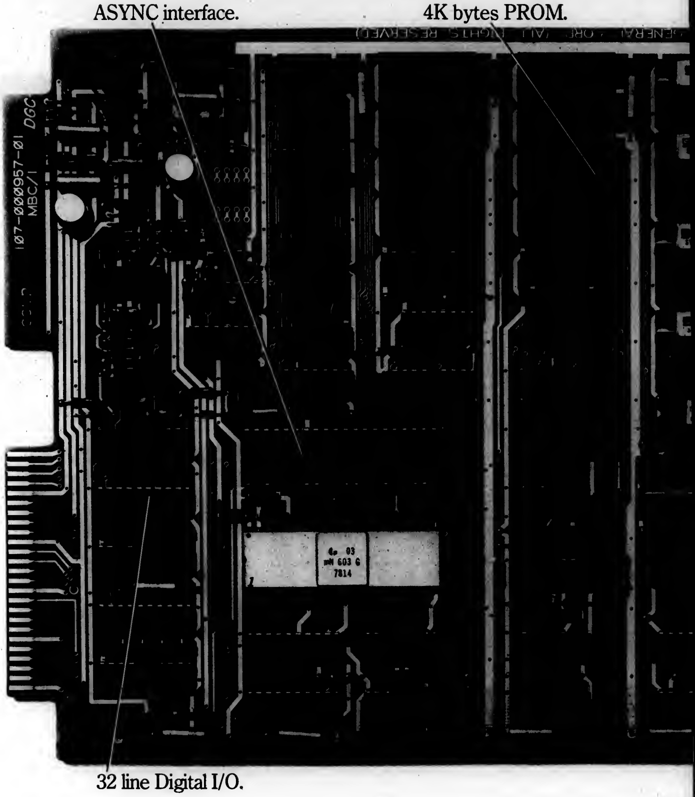
Intel Corp. 2141

The units' maximum access times range from 120 nsec to 250 nsec, the spokesman said.

Prices for members of the 2141 family start at $18.75 in quantities of 100 to 999. Intel is at 3065 Bowers Ave., Santa Clara, Calif. 95051.

SUMMER SPECIAL !!
LIMITED OFFER • CALL NOW
LA36 DECWRITER II $1495
LS120 DECWRITER III $2595
IMMEDIATE DELIVERY
CALL 1-800-225-1942
617-272-8372
New England's Leading Data Terminal Specialists
computrend inc.
22 "A" Street, Burlington, Mass. 01803

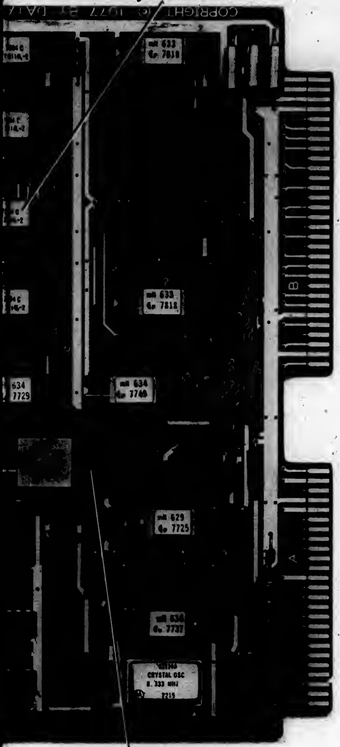
ROOM & BOARD.



All in a space of 7.5 x 9.5 inches.

$725.*

2K bytes RAM.



16-bit microNOVA.

Introducing the Data General microNOVA Board Computer, MBC/1. The smallest, most functional 16-bit single board microcomputer you can buy. More power and capability in less space than any other. It's a full 16-bit processing unit. And it has multiply/divide, stack architecture, data channel (DMA) and 16-level priority interrupt, 2K bytes static RAM, sockets for up to 4K bytes of PROM. It also has async interface, 32-line digital I/O, optional console debug software and self-test diagnostics. All in a space of 7.5 x 9.5 inches.

It's all supported by our MBC/M real-time multi-tasking monitor and monitor emulator that lets you develop software under Data General's AOS, RDOS and DOS operating systems for execution on MBC/1.

To go along with all of this, there's a full array of compatible interfaces, design interface support, compatible software and excellent program development tools. If you want more board in less room, reserve a Data General MBC/1 microNOVA Board Computer. For more information, mail the coupon, call Data General or your nearest full service industrial distributor: Schweber or Wyle (Elmar/Liberty). Or call your local dealer.

*Single unit price. Quantity discounts available.

CW522

Mail to: microNOVA PRODUCT INFORMATION
DATA GENERAL CORPORATION,
WESTBORO, MA 01581

Name Title

Company Tel. No.

Address

City State Zip

Data General Corporation, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., Ontario. Data General Europe, 61 rue de Courcelles, Paris, France, 766.51.78. Data General Australia, (03) 89-0633. Data General Ltda., Sao Paulo, Brazil, 543-0138. Data General Middle East, Athens, Greece, 952-0557. © Data General Corporation, 1978.
microNOVA is a registered trademark of Data General Corporation.

Data General

We make computers that make sense.

Pichler Numeric Display Addressable by Bus

LITTLETON, Mass. — Pichler Associates has introduced a bus-addressable digital panel display that it said is compatible with 8-bit and 16-bit microprocessor systems.

The DP08 has its address encoded in the bus connector to facilitate interchanging or replacement without internal adjustment or rewiring, the firm claimed.

Binary weighed, address select lines allow up to 32 of the peripheral interface adapter (PIA)-compatible displays to operate from the same 9-wire signal bus. Once addressed, the display accepts up to eight binary coded decimal (BCD)-encoded digits from the bus at a rate of 200k digit/sec, the firm said.

Pichler DP08

An optional integral address thumbwheel is available to aid in adress selection, the firm noted.

The display is priced from $215, the company said from 410 Great Road, Littleton, Mass. 01460.

Dashboard Micro System Shows Car and Road Data

HOLLAND, Mich. — A driver-operable automotive computer introduced by the Prince Corp. has five programmable memories and is capable of 24 different functions, the firm said.

The Prince On-Board Computer registers such data as miles to go, vehicle location, miles per gallon, and cost per mile via a speed and fuel flow transducers connected to the automobile, a spokesman explained.

The unit incorporates a microprocessor with 12,600 words of memory and a ribbon fiber optic lighting system for control panel illumination.

Prince Corp.'s On-Board Computer calculates road data using a microcomputer and speed/fuel flow transducers.

The device draws approximately 30mA of power and connects on or under the dashboard by an adjustable bracket. Twin LED displays provide a digital readout to six places.

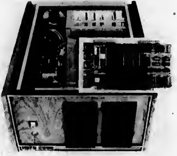
The automotive computer is priced at $400 from the firm at P.O. Box 6, Holland, Mich. 49423.

Floppy System Fits S-100 Units

CARSON, Calif. — Info 2000 Corp. has announced a floppy disk system for S-100 bus microcomputers that utilizes Persci, Inc. dual diskette drives and incorporates Digital Research, Inc.'s CP/M operating system.

The system, which accepts soft-sectored 8-in. flexible diskettes, is compatible with IBM 3740 format and has voice-coil positioning that provides seek times up to eight times faster than other drives using stepping motors, Info 2000 claimed.

The floppy system also uses the firm's Discomem controller board, which contains two RS-232 serial interfaces with software-selected data rates from 50 bit/sec to 19.2 K bit/sec, three 8-bit TTL-level parallel interfaces and a provision for 7K of erasable programmable read-only memory (Eprom) and 1K of random-access memory (RAM).



Info 2000 Corp. business system incorporates dual diskette drives, voice coil positioning and Digital Research, Inc.'s CP/M operating system.

The I/O facilities of the system enable the Discomem controller to be combined with two additional S-100 logic boards — an MPU and a 32K RAM board — to create a disk-based microcomputer system for business or scientific applications, the firm explained.

The cost of the system, including I/O facilities and CP/M software, is $2,600. Another model without I/O facilities is available for $2,450 the company said from 20630 S. Leapwood Ave., Carson, Calif. 90746.

ATTN: 3270 USERS

Here's a *tailor-made* system to fit the requirements of your job today. In addition, BRAEGEN's multi-tasking intelligent controller offers the flexibility you will require in the future. **Systems Programmers,** in particular, find the following features very valuable.

Both Local and Remote 3270 are available, of course,

PLUS . . . .

Local Job Entry. Line printers up to 1200 LPM with 1403 addresses and card readers with 2501 addresses can be placed next to any BRAEGEN CRT. These "hot" printers and readers are located in the users' areas up to 7,500 feet outside the computer room. Most popular uses are for programmer listings and accounting work. Users get the benefits of increased productivity because turn-around time is reduced to minutes.

PLUS . . . .

Address Switching. Any BRAEGEN CRT terminal provides as many addresses as required for Console, TSO, Applications, etc. Any CRT can have both Local and Remote addresses. This feature can reduce the number of CRT's required and will eliminate NCP, VTAM type software overhead requirements.

PLUS . . . .

Multiple Controller Interfaces. The BRAEGEN controller allows multiple channel and remote interfaces. Any CRT can access multiple local IBM CPU's or remote CPU's. Just 2-3 seconds to switch a CRT between CPU's or addresses.

PLUS . . . .

Fast Cursor, Programmable Keyboard, 7500′ Coax, Multiple Drops per Coax, Wide range of speeds in 3286/3288 compatible printers; from 45 cps to 1200 LPM, Offline Data Entry, and our Offline TSO Editor.

PLUS . . . .

Features others have promised for 1978-1979 are AVAILABLE NOW . . . Local Copy, 128 character set CRT, Typamatic keys, Home key, etc.

PLUS . . . .

Low Prices — 1, 2, 3 year leases available.

Customers throughout the U.S. are benefiting from these features now. For more information please write or call; The BRAEGEN Corporation, 20740 Valley Green Drive, Cupertino, California 95014. (408) 255-4200.

BRAEGEN

Shows Scheduled From Coast to Coast

Following is a listing of all the significant microcomputer shows whose management has notified *Computerworld* of the dates. The microcomputer show business is highly volatile, and hobbyists should contact show managers before making firm plans to attend.

June 5-8, Anaheim, Calif. — **National Computer Conference & Computer Festival.** Contact: Steve Miller, SRI International, 333 Ravenswood, Menlo Park, Calif. 94025.

June 23-25, Detroit — **Macc Computerfest '78.** Contact Jim Rarus, Semco, Box 9578, North End Station, Detroit, Mich. 48201.

Aug. 25-27, Philadelphia — **Personal Computing '78.** Contact John Dilks, Rt. 1, Box 242, Mays Landing, N.J. 08330.

Sept. 15-17, New York — **Second National Microcomputing Exposition and Conference.** Contact: H.A. Bruno & Associates, Inc., 78 E. 56th St., New York, N.Y. 10022.

Sept. 29-Oct. 1, Dallas — **International Microcomputer Exposition (IME).** Contact: IME, 413 Carillon Tower, 13601 Preston Road, Dallas, Texas 75240.

Oct. 5-8, Chicago — **Second Midwest Personal Computing Exposition.** Contact: Louise Garcia, 1435 Rio Rancho Drive, S.E., Rio Rancho, N.M. 87124.

Oct. 12-15, Chicago — **1978 Mid-America Personal Computer Show.** Contact: International Personal Computer Shows, Inc., P.O. Box 844, Greenwich, Conn. 06830.

Nov. 3-5, Los Angeles — **Third West Coast Computer Faire.** Contact: Jim Warren, The Computer Faire, P.O. Box 1579, Palo Alto, Calif. 94302.

'Programmer's Workbench'

Northwest Melds 8085A, Pascal

EUGENE, Ore. — Northwest Microcomputer Systems, Inc. has announced a "programmer's workbench" that reportedly combines the throughput of the 3 MHz Intel Corp. 8085A and the power of Pascal.

The 85/P system includes an 8085A. CPU, a Pascal 725 line/min compiler/interpreter and CP/M software supporting Basic, Cobol (available in July) and Fortran.

Also featured are direct memory access, two Shugart Associates floppy disk drives with 1M of on-line storage and 54K of 450 nsec, user-available static random-access memory, the firm said.

A keyboard with 103 keys, two serial communications ports, two parallel ports and a 24- by 80-character display on a 12-in. CRT screen are also included. All components are enclosed in a single cabinet.

The 85/P provides the "full Pascal environment," according to the spokesman, including random and sequential files, a screen-oriented editor, interactive source-linked debugger and full documentation plus a 90-day warranty.

The entire system costs $7,495 from Northwest at 121 E. 11th, Eugene, Ore. 97401.

Catalog Cites Dynage Line

BLOOMFIELD, Conn. — Dynage, Inc. is offering a catalog describing its line of logic and I/O modules designed for hazardous industrial control applications.

The modules detailed in the booklet operate at standard logic levels (+5 Vdc for logic 1 and 0Vdc for logic 0) and can be directly interfaced to solid-state sensors, a spokesman stated.

The product line includes logic gates, expanders, timers, counters, comparators, decoders, shift registers, flip-flops, input converters, output drivers, diode matrices and other hardware.

The catalog is available free from the firm located at 1331 Blue Hills Ave., Bloomfield, Conn. 06002.

The Computer for the Professional

The 8813 was built with you, the professional, in mind. It quickly and easily processes cost estimates, payrolls, accounts, inventory, patient/client records and much more. You can write reports, briefs, and proposals on the 8813's typewriter keyboard, see them on the video screen, and instantly correct, revise, or print them.

Using the 8813, one person can process what would normally require many secretaries, several bookkeepers, and a great deal of *time*. And data storage takes a small fraction of the *space* used by previous methods.

You don't need to learn complicated computer languages. The 8813 understands commands in English. If you want to write your own programs, the 8813 includes a simple computer language, BASIC, that you can master in a few days. The 8813 slashes the professional's overhead. It's a powerful time and money-saving ally. Prices for complete systems including printer start at less than $8,000.

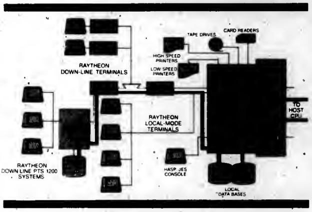
See the 8813 at your local dealer or contact PolyMorphic Systems, 460 Ward Drive, Santa Barbara, California, 93111, (805) 967-0468, for the name of the dealer nearest you.

PolyMorphic Systems

BLIS COBOL
MULTI USER OPERATING SYSTEM
MINI
SYSTEMS
For information call today...
IPI
Phone [illegible] USA
TWX/Telex [illegible]
[illegible] Winter Park
(Orlando), Florida [illegible]

The Raytheon Checklist.
A distributed processing user's best friend.

The term distributed processing is new enough that many people, both users and manufacturers, mean many different things when they talk about it.



Shown above is a typical schematic of a PTS/1200 distributed processing system with a hierarchy of local data bases, multiple terminals in multiple applications, all linked by one or more protocols to a central mainframe

Rather than try to add another definition to the many now existing, Raytheon Data Systems has prepared this comparative checklist of the major functions that might normally be considered attributes of any distributed processing system. Regardless of the distributed processing system you eventually select, there are a number of capabilities you will want that system to possess. Obviously, the more features the system has, the greater its capacity to do all the work you have planned now—or might need tomorrow.

Our checklist itemizes many of the most important features you should consider. They are not the only features, but we think they are the most important.

And—to make the point that Raytheon's PTS/1200 MARK·1 and MARK·II systems are extraordinarily powerful distributed processing systems—we've taken the liberty of itemizing their capabilities in each of the columns shown. Do that with other vendors' equipment, and we think you'll choose Raytheon.

Then check prices. The MARK·I is lowest.

After you've looked at the variety of products on the market, you'll also want to see what each costs.

We can tell you about Raytheon's pricing. The PTS/1200 MARK·I is the lowest. By low, we mean up to 30 per cent below the most popular alternative models. The PTS/1200 MARK·II costs a little more, but is more than twice as powerful as the MARK·I. You won't be able to compare its cost directly with other equipment, because no other equipment can come close to matching its performance.

Solving the installation and productivity problems that these users encounter takes patience, skill and the commitment of an experienced vendor. It takes going beyond a standard product, and finding customized solutions, and often products, to meet a user's requirement.

Most of all, it takes doing it. Over and over and over again. Raytheon has done it over and over and over again.

Fast, easy installation and growth is vital.

Not shown in the checklist is another vital aspect of distributed processing systems—immediacy of installation and ease of expansion. The Raytheon PTS/1200 MARK·1 can be installed in less than a day, with no change to host hardware, or systems or applications software. You become productive right away. And when you want to grow, you simply add capacity—within a single system, or by adding additional systems or devices. Every PTS/1200 is compatible with every other—and with your host mainframe system and protocols in almost every case.

Look hard at experience too.

Beyond the hardware, the price and the easy compatibility, there is the experience factor. The vendor with experience can save the user without it a lot of grief.

Raytheon is the world's largest non-mainframe supplier of intelligent terminals and distributed processing systems. Some of our customers use more than 2,000 Raytheon terminals in data networks located at more than 300 locations either domestically or around the world. Many others have one or several PTS/1200 distributed processing systems at work in remote locations, linked on-line to a central mainframe.

A typical four-station MARK·1 system with a 64K-byte controller, 10 MB disk, and one 165cps printer leases for $850 per month, including all software and maintenance.

The 54-Point Checklist

Feature	Typical Configuration	Importance of Feature	Product Capabilities			
			PTS/1200	Brand X	Brand Y	Brand Z
INTELLIGENCE	✓ Dependent totally on host processor	Intelligence is based upon the amount of available programmable memory a system possesses. Its purpose is to facilitate local application development and execution. The larger the available memory, the better the applications freedom.	N/A			
	✓ Stand alone (non shareable) intelligence in each station		All resources shareable by all stations			
	✓ Small-cluster (shared by 1-8 stations)		64K to 128K bytes			
	✓ Large cluster, shared by 1-24 or more stations		64K [illegible] bytes			
CONTROLLER	✓ Word size	The controller is the central processor of a distributed system. Its power in terms of word size, attachment capacities, programmability and ability to perform multiple tasks concurrently is the key limiting factor in its ultimate performance	16-bit			
	✓ Number of operator stations per controller		[illegible] stations or 1-24 stations			
	✓ Number of peripheral attachments per controller		1-4 peripherals, or 1-20 peripherals			
	✓ Availability of high-level languages		Yes, MAC[illegible] COBOL in the future			
	✓ Ability to perform multi-tasking		Yes Up to 32 tasks concurrently on one controller			
TERMINALS	✓ Variety of screen sizes	The terminal is the point of operator interface and should be capable of being comfortable to use, easy to use, and easily matched to one or many different applications through customizing	[illegible]			
	✓ Variety of keyboard options		3270 typewriter, data entry			
	✓ Availability of user definable function keys		[illegible] program function keys [illegible] any key programmable			
	✓ Ability to provide operator prompting		Yes, by screen, audio and light indicators			
	✓ Ability to attach [illegible]					
PERIPHERAL ATTACHMENTS	✓ Number of attachments per controller	The ability to attach a variety of peripheral equipment of various speeds and capacities is a measure of the range of work a system can do	1-4, or 1-20, any combination			
	✓ [illegible]		[illegible]			
	✓ High-speed printer devices		300 LPM and 600 LPM			
	✓ [illegible]		[illegible]			
	✓ Magnetic tape transports		800 and 1600 BPI			
	✓ [illegible]					
COMMUNICATIONS PROTOCOLS	✓ Asynchronous	The ability to support more than one protocol—at the same time on the same system—adds immeasurably to the number of tasks and number of networks a system can work in without additional user development effort	Yes TTY RS-232			
	✓ [illegible]					
	✓ Binary Synchronous —Batch		Yes			
	—Interactive		Yes			
	✓ [illegible]		[illegible]			
INTELLIGENT 3270 OPERATIONS	✓ Local format storage	This feature assures that the system can work immediately and easily with the most popular terminal devices in use today and extend the performance of those devices in a variety of ways	Yes			
	✓ [illegible]		[illegible]			
	✓ Ability to access and update local data bases		Yes			
	✓ Transactions stored locally, batched for transmission to host		[illegible]			
	✓ Field verification at each terminal location		Yes			
	✓ Application program decides when to go to host		[illegible]			
EMULATION CAPABILITIES	✓ 3270 interactive (dumb)	Emulators are software tools that permit a system to operote as a look-alike under other vendors protocols and procedures. Their advantage is to permit direct and immediate attachment to networks using a specific device protocol	Yes			
	✓ 3270 interactive (intelligent)		[illegible]			
	✓ 2780 batch		Yes			
	✓ 3780 batch		Yes			
	✓ SDLC batch/interactive		Yes, in 1979			
	✓ HASP remote [illegible]		[illegible]			
	✓ Non-IBM protocols		Yes			
	✓ Specialized protocols		[illegible]			
DATA BASE STORAGE	✓ Multiple disk storage capacities	Local data base storage under sound memory management techniques assures powerful local filing, easy offloading of large central files and elimination of unnecessary communications to and from host	Yes from 10 to 320MB			
	✓ Memory-management software		[illegible]			
	✓ Ability to expand to very large local storage		Yes, to 320 MB per system			
SOFTWARE LANGUAGE	✓ Assembly language	Language is the facility that makes it possible to tap the power of the basic system by allowing applications to be written easily. Simple but rich high-level language that can be learned easily by programmers or used by non-programmers extend a system's reach that much further	Yes, but not needed by [illegible] personnel			
	✓ Strong macro command repertoire		Yes, 150 instructions			
	✓ High level compiler languages		MA[illegible] [illegible] 1979			
	✓ Easy-to-learn and use		Yes			
	✓ Numerical screen manipulation and interactive programming aids		Yes			
	✓ Parameter-driven aids where required		Yes, for format creation and source data entry			
NETWORK ENHANCEMENTS	✓ Concurrent communications operation		Yes, batch and interactive at same time			
	✓ Downline control of multipoint networks		Yes, up to 10 drops per controller			
	✓ Remote program development support for mainframe in any language		Yes			
	✓ Teleprinter network on terminal lines		Yes, on same lines at same time			
	✓ Downline program debugging		Yes			
	✓ Downline terminal loading		Yes			
	✓ High speed data transmission rates		[illegible] 9600 B[illegible]			

Raytheon—50,000+ terminals in use now.

When you select Raytheon, you are selecting a total single-source supplier who has installed more than 50,000 intelligent terminals. A supplier with a worldwide field maintenance organization that is linked together by its own distributed processing network that keeps track of every equipment outage for every customer. A supplier that does not need to offer third-party leasing, because it maintains its own self-financed leasing company. And a supplier whose customer list includes a very high percentage of the world's largest industrial, commercial, financial, insurance and government data systems users.

Raytheon, The company to pick when you've completed your distributed processing checklist.

Tell me more about the Raytheon PTS/1200 distributed processing family: CW5178

☐ MARK-1
☐ MARK-II

Tell me more about some of the features shown on The Checklist. I'm especially interested in:

1. ____________________
2. ____________________
3. ____________________
4. ____________________

☐ Have a salesman call.
☐ Send me more information.

Name: ____________________
Title: ____________________
Company: ____________________
Street: ____________________
City: ____________________
State: ____________ ZIP: ________

Intelligent Terminals, Minicomputers, Distributed and Word Processing Systems

RAYTHEON

RAYTHEON DATA SYSTEMS

1415 BOSTON-PROVIDENCE TURNPIKE • NORWOOD, MASSACHUSETTS 02062
Call Director, Field Marketing, at (800) 225-9874 (toll free)
Inside Massachusetts call (617) 762-6700 • TWX: 710 336-0646 • TELEX: 92-4406

ATLANTA (404) 321-3064 • BOSTON (617) 237-4190 • CHICAGO (312) 694-4420 • DALLAS (214) 661-9722 • DENVER (303) 371-0990 • DETROIT (313) 358-3990 • GREENSBORO (919) 294-5811 • HARTFORD (203) 269-6281 • HOUSTON (713) 771-5651 • KANSAS CITY (816) 561-9333 • LOS ANGELES (714) 979-5800 • MIAMI (305) 592-3884 • MINNEAPOLIS (612) 854-2666 • NEW YORK CITY (212) 661-2790 and (212) 695-2567 • PHILADELPHIA (609) 665-8466 • PITTSBURGH (412) 281-2117 • SAN FRANCISCO (415) 692-4840 • SEATTLE (206) 453-0650 • TULSA (918) 663-7852 • WASHINGTON, D C (703) 979-6100 • OVERSEAS AMSTERDAM (020-93-0787) • FRANKFURT (49-6196-46629) • AUSTRALIA (61-2-297721)

If your floppy disk isn't a BASF FlexyDisk, you could be paying too much.

If you buy your diskettes from the same company that made your equipment, BASF could save you a bundle. Compare our prices on floppy disks—any configuration you're using—with what you're paying now. You could be in for a surprise.

Worried about compatibility? Here's another surprise . . . BASF is one of the world's largest suppliers of magnetic media to equipment manufacturers. And whether it's regular, mini, hard, soft, single, double or dual, BASF makes it. So, the diskette you're using right now may very well have been made by BASF. In any case, BASF magnetic products meet or exceed all equipment manufacturers' specifications and standards . . . and, you save plenty by buying direct.

Talk to your BASF supplier, and find out how to get the most from your equipment while saving plenty on diskettes. For details on the complete line of BASF FlexyDisks, contact your nearest supplier or write: BASF Systems, Crosby Drive, Bedford, MA 01730, or call (617) 271-4094.

BASF The Original.

Computer Tape Disk Packs Diskettes Cassettes Mag Cards

Now Eight Times Smaller

IBMers Reduce Size of Magnetic Bubbles

YORKTOWN HEIGHTS, N.Y. – IBM scientists here have been able to experimentally make magnetic bubbles that are eight times smaller than those now commercially available – using present materials, techniques and technology.

And while that work was under way, IBM researchers at the firm's San Jose, Calif., facility have patented a method for precision alignment of garnet material that can save as much as 50% of the garnet material normally lost in the slicing process.

Magnetic bubbles are circular regions of reverse magnetization formed in thin-film garnet materials in the presence of a magnetic field. They offer the potential for very high-density storage of information in devices that have no moving parts.

Doctors E.A. Giess and R.J. Kobliska at the IBM Thomas J. Watson Research Center here began a comprehensive study in 1976 of garnet materials to determine more fully the limits to which present-day bubble fabrication techniques might be taken. Their study revealed certain combinations of garnet materials and processing procedures are capable of forming very small bubbles. The results of their investigation were announced in a scientific paper presented in Florence, Italy, at the recent International Magnetics Conference (Intermag).

The experiments demonstrated that stable magnetic bubbles as small as .4 micron in diameter can be formed, compared with the 3- to 5-micron bubbles used in devices today. A micron is 1/25,000 in.

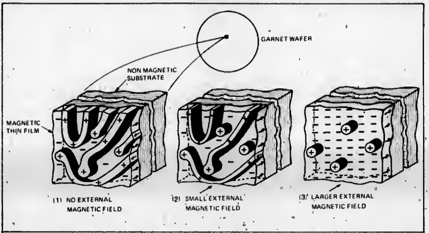
A square-inch garnet with 3-micron bubbles today can hold three million bits of information, whereas a square inch of garnet material may be able to hold 100 million bits of information, using the .4-micron bubbles reported in this study.

Giess and Kobliska focused their attention on measuring the physical and chemical properties of garnets, examining the formation of magnetic bubbles in magnetic fields representative of those needed for bubble devices.

Although their work did not include the making of devices (actual computer components), Giess said the study furnishes basic data needed if devices using bubbles smaller than a micron are to be designed.

"This is really a framework for submicron bubble garnet chemistry," he said. "I'm sure the device engineers will find our work use-

(Continued on Page 76)


GARNET WAFER
NON MAGNETIC SUBSTRATE
MAGNETIC THIN FILM
(1) NO EXTERNAL MAGNETIC FIELD
(2) SMALL EXTERNAL MAGNETIC FIELD
(3) LARGER EXTERNAL MAGNETIC FIELD

This diagram illustrates how bubbles are formed on a garnet wafer by applying an external magnetic force. The wafer is really a sandwich, consisting of a very thin magnetic film garnet grown on a nonmagnetic substrate.

In the absence of an external field (1), the magnetic film has regions that may be magnetized in one of two directions (represented by plus and minus signs). As an external field is applied (2), the magnetic regions with the same direction as the external field expand and the regions magnetized in the opposite direction shrink until they form little circular cylinders (3).

When viewed from above, these regions of reverse magnetization look circular, leading to the term "magnetic bubbles."

Speculator on IBM's Next Move Sees Multimedia Networking

By Joe Auer
Special to CW

Speculation on IBM's next move should contain two important considerations: when and what. This scenario is based on a series of seemingly unrelated IBM actions.

The "when" is the very early 1980s; the "what" is a new way of doing business – an evolution that future DP historians will record as a revolution few people noticed until it was over.

The suggestion that IBM's long-range business strategy is being seriously threatened by competitive DP products is wishful thinking. To be sure, IBM may be feeling some interim impact from plug-compatible manufacturers (PCM) competition, Japanese mainframes and the like, but IBM's strategies have never been limited to short-term reaction to competitive products.

Rather, IBM has pursued a "grand strategy" that both limits short-term competition and maximizes long-term corporate goals. Despite public fascination over the recent 30 series announcements, IBM is in the process of pursuing a far more important path that should become clear by the early 1980s.

Analysis

By 1980 or 1981, IBM should announce, and begin implementing, an extensive information networking system that will link automated office machines, copiers and facsimile devices, intelligent terminals, small business computers and mainframe communications systems through multipoint voice, digital and teleconferencing communications. In taking this step, IBM will literally

(Continued on Page 80)

TI745's, 743's, 765's, and 763's

IN STOCK!!!

Single Source—Coast to Coast ☐ Fast Delivery—Nationwide
National Service—Our Own Experts ☐ Low Cost—Big Savings

Believe it or not, Data Access Systems, Inc. has *hundreds* of portable data terminals available for fast delivery, with stocking points and service nationwide. Don't wait for promises, we are TI's largest data terminal dealer. We also stock DEC's LA36, LS120 & LA180; Diablo's 1620 & 1641; Lear Siegler's ADM 1, 2 & 3 and the Teletype 43. Compare suppliers for *product, price, delivery* and *service*; you'll come to **"The Data Terminal People."**

Call your local district office,
or toll free numbers: East 800-631-9604 West 800-227-4406

DAS
"THE DATA TERMINAL PEOPLE"
Data Access Systems, Inc.

Corporate offices:
100 Route 46, Mountain Lakes
N J 07047 • (201) 335-3322
or Toll Free (800) 631-9604

District offices:
Boston – (817) 933-8822
Washington, D.C. Area – (703) 525-2923
Phila. So. Jersey – (609) 854-0070
Chicago – (312) 298-0777
Los Angeles – (213) 538-4100
San Francisco – (415) 391-5535

IBM Scientists's Bubbles Eight Times Smaller

(Continued from Page 75)

ful. The more bubbles you can put on a chip, the lower the cost per bit on that chip, and that's what you want."

In the thin-film magnetic layer, the atoms of iron and some of the other elements each behave like tiny magnets, with "north" and "south" poles.

If there were no other factors at play, these atomic magnets would line up perpendicular to the surface plane of the material, with half of the atoms pointing "north pole" up and half with "north pole" down. However, bonding forces within the crystalline atomic structure of the material are such that each atomic magnet is induced to line up parallel to its neighbor.

This results in the formation of regions, or "domains," in the material where groups of atoms are lined up either all "north up" or "north down."

When an external magnetic is applied perpendicular to the magnetic film, the domains aligned in the same direction as the outside field expand and the domains magnetized in the opposite direction shrink. As the outside field is increased the domains of reverse magnetization become smaller and, when viewed from above, circular. Actually, they are right circular cylinders.

These circular areas are called magnetic bubbles. The presence or absence of a bubble can be used to represent the binary numbers of "one" and "zero" that make up computer language.

The man-made garnets used for magnetic bubbles may contain, in addition to iron and oxygen, one or several of the rare earth elements, such as gadolinium, yttrium, europium, samarium, lutetium and neodymium. But what all garnets share in common is a lattice-like atomic structure that acts as template, or blueprint, for "growing" layers of garnet on a base, or substrate, of existing garnet material.

The garnets used for bubble technology today are comprised of a non-magnetic substrate on which is grown a very thin (only 1/200 the thickness of a human hair) film of magnetic material. Both the film, and the substrate are garnets, but of different chemical elements.

For example, the film garnet contains iron (the principal source for magnetic properties) and the substrate garnet does not. Yet the iron-containing garnet will grow on the substrate according to the lattice structure of the base material.

Since the rate of growth is well-known, scientists can control the thickness of the new layer, or film, by simply stopping the process at the desired time. This is important because the size and magnetic properties of the bubble formed are related directly to the thickness of the magnetic film.

The bubble diameter should be about the same size as its height; otherwise, it will not be stable. Bubbles less than a micron in diameter therefore require films less than a micron thick.

Giess and Kobliska investigated the 12 possible combinations that result from working with two kinds of films, three substrates and two orientations (atomic lattice angular directions).

One of the orientations is called "111" and is used in industry today because crystals are easy to grow in this configuration and it produces films with good magnetic properties. The other orientation is called "100," in which the arrangement of atoms at the surface of the garnet substrate is slightly different than in "111."

The two film types examined by the IBM scientists were one containing europium, lutetium, iron and oxygen and one in which samarium was substituted for the europium.

The substrates included the most common one in use today, gadolinium gallium garnet (GGG), and others using neodymium (NGG) and samarium (SGG). Giess and Kobliska found samarium-based films supported the smallest bubbles, but the bubbles in these films were harder to move around than in europium-based films.

Thus the designer of a bubble device might opt for .6-micron bubbles with greater mobility over .4-micron bubbles moving more sluggishly through the film. A lot depends on the purpose of the device, the researchers noted.

West Coast Research

Meanwhile, in San Jose, Johannes Grandia and J. Charles Hill invented a precision alignment method that can reportedly save as much as 50% of the garnet material normally lost during the preparation of magnetic bubble storage devices.

The process for slicing this hard, single-crystal material into wafers, on which bubble patterns are formed, could save several million dollars for bubble materials suppliers during the next few years, IBM said.

Garnet is expected to be to the bubble memory business what silicon is to semiconductors. Published estimates by bubble materials suppliers project a surge in garnet crystal volume from a current $3 million to over $40 million by 1982.

Co-inventors Grandia and Hill received Patent 4,084,354 for work done at IBM's General Products Division development laboratory in San Jose.

Also suitable for other hard materials like sapphire, their method has potential for processing large silicon crystals used in solar energy applications, IBM said.

In preparing the base material for bubbles, IBM's patented process differes from current methods by first shaping the garnet crystal so its geometric axis is aligned with its crystallographic axis, comparable to the "grain" of the matrial. The heretofore stationary crystal, which is considerably harder than silicon, is then rotated perpendicular to a thin rotating diamond saw blade.

As wafers are sliced, two extremely flat, parallel surfaces are produced with the proper crystallographic orientation for bubble devices.

The wafers can be polished directly to a smooth finish, eliminating a costly and time-consuming lapping stage that typically consumes as much as 20% of the garnet material to obtain parallel surfaces.

INTERDATA USERS
Interested in a FAST™ Operating System?

CYBERTEK's® new, unique FAST/16™ and FAST/32™ operating systems give you big mainframe capabilities on your Interdata 16-bit or 32-bit processor. FAST/16 and FAST/32 feature concepts and facilities similar to IBM's OS/MVT and OS/VS1. These include:

☐ Multi-tasking with an unlimited number of tasks
☐ Dynamic memory allocation with no fixed partitions
☐ Five different access methods - including HISDAM, a hierarchical indexed sequential direct access method
☐ Multi-terminal support
☐ Powerful, terminal oriented command language

These and many other user-oriented features are contained in a compact system with a basic SYSRES of only 20K.

FAST derives its name from its ability to handle many concurrent tasks rapidly and efficiently. You can simultaneously perform program development and multi-terminal applications. This is a powerful system that brings out the best in your Interdata processor.

Developed by Edes Associates and field-proven in numerous installations, these systems are now available from CYBERTEK.

For immediate information on FAST/16 or FAST/32, call or write now to John Seddon at.

CYBERTEK COMPUTER PRODUCTS, INC.
3255 Wilshire Blvd., Suite 1400, Los Angeles, CA 90010
(213) 487-2860

CYBERTEK

TONE 3

TSO for VS1
CHECK THESE FEATURES

- Edit with full screen capability
- Internal reader job submit
- Output retrieval with RES support
- System maintenance
- Program development
- Data entry
- System debugging
- Text editing
- Performance monitoring support
- User command interface
- Interactive program execution
- Operation console support
- Dataset maintenance
- Catalog management
- Standard IBM TSO command
- Enhanced 3270 capability
- Full ASCII terminal support
- No user swapping
- No TCAM
- No VS 2 overhead

TONE

[illegible] TRASK AVE
GARDEN GROVE CA
[illegible]

eeo$?

Last year 80,000 workers won $125 million for EEO violations. . .

This year you could be involved . . .

There is a solution . . . first don't discriminate . . . Then let a Wang Human Resource Management System prove you don't discriminate.

You can find more on Wang Software for your IBM/Burroughs/Honeywell/Univac system with a call to Joe Nestor (617) 851-4111, Wang Laboratories, Inc., Lowell, MA 01851.

WANG

Reject End to South Africa Business

CDC Shareholders Put Curbs on Takeovers

MINNEAPOLIS — Control Data Corp. shareholders at the recent annual meeting approved two amendments to the articles of incorporation designed to prevent unwanted takeovers and overwhelmingly rejected a proposal to restrict the firm's activities in South Africa.

One of the amendments that the board of directors considered concerned the expected social and economic effects of a takeover on noncontrolling stockholders, employees and other constituents of the company.

The second amendment sets forth specific steps which must be taken prior to completing a merger, including the guarantee of a minimum price per share for stockholders not voting for the merger and assurance by the acquiring entity that it will not substantially alter the two major areas of the firm's business — computers and financing.

Both articles reflect the concern of William C. Norris, chairman and chief executive officer, for the small investor facing a takeover by institutional or other large investors, a CDC spokesman noted.

Commenting on the rejection of the proposal by the United Presbyterian Church calling for a limitation of CDC's activities in South Africa, CDC management stated the measure would end the firm's commitment to work for constructive changes in South Africa.

Norris called on individual investors to support corporations that help solve major social problems, citing examples of CDC's application of technology to bettering society. Specifically he pointed to CDC's establishment of four plants in economically depressed areas and the work it has done with South Dakota's Rosebud Indian Reservation in applying computer technology to improving health care delivery.

On April 26, just a few days prior to the annual meeting, CDC pleaded guilty to making illegal payments to a foreign government and was fined $1.4 million. In response to shareholder criticism, outside director Joseph M. Barr stated that questionable payments to foreign governments had stopped.

In other business, shareholders reelected 16 members of CDC's board of directors without opposition.

Without being more specific, Norris said CDC would meet or exceed budget expectations for this year.

Scan-Data Inks CDC Agreement

NORRISTOWN, Pa. — Scan-Data Corp. recently signed a memorandum of understanding with Control Data Corp. (CDC) providing for cooperative business arrangements between the two companies and for an investment in Scan-Data by CDC.

Specific contracts and details still have to be negotiated. The completion of the transaction is subject to several conditions, including agreement by Scan-Data's noteholders to exchange their notes for Scan-Data common stock and approval by the company's major lender to the restructuring of its current debt.

"From a financial point of view, the restructuring of our company's debt and the infusion of new capital will substantially improve our financial posture and profitability," according to Robert R. Burns, president of Scan-Data.

Two of the proposed future business arrangements are Scan-Data's assumption of marketing responsibility for CDC's optical character recognition products and CDC's assistance with Scan-Data's Positran fast food order and entry control system.

The agreement, according to CDC President Robert M. Price, is a continuation of CDC's cooperative business approach that stresses the independence of smaller enterprises extends the resources of larger ones.

Acquisitions

United Telecommunications, Inc., has made an agreement in principle for the acquisition of **Calma Co.** Calma will operate as a division of United Computing Systems, Inc.

American Computer Sciences, a New York software house, has announced its merger with **Teleprocessing Techniques, Inc.,** a New Jersey software corporation.

National CSS, Inc. has agreed in principle to acquire **Zytron Corp.,** a privately held company based in Menlo Park, Calif. The proposed transaction is subject to the approval of Zytron's board and stockholders, the National CSS board and certain other conditions.

NCR Corp. has agreed in principle to sell its **Appleton Papers Division** to **B.A.T. Industries Ltd.,** the British group operating in the tobacco, paper, cosmetics and retailing industries, for a cash purchase of $280 million. The agreement is subject to approval.

INFONATIONAL
WILL PUT IT UP

We can help you put it up with:
- PROVEN SYSTEMS
- PROFESSIONAL TRAINING
- COMPLETE DOCUMENTATION

RUN WITH THE BEST
IN INTEGRATED ACCOUNTING SYSTEMS

INFONATIONAL
A Division of United Computing Systems, Inc.

For the most cost-effective, easy-to-operate, integrated accounting systems, call (714) 560-7070 or mail in this coupon.

INFONATIONAL
A Division of United Computing Systems, Inc.

6626 Convoy Court
San Diego, CA 92111
(714) 560-7070

UCS

NAME: ____________
TITLE: ____________
COMPANY: ____________
ADDRESS ____________
CITY: ____________
STATE: ____________
ZIP: ____________
PHONE: ____________
CW578

I AM INTERESTED IN:
- ☐ GENERAL LEDGER
- ☐ ACCOUNTS PAYABLE/ PURCHASE ORDER
- ☐ FIXED ASSETS ACCOUNTING
- ☐ ACCOUNTS RECEIVABLE/ SALES ANALYSIS

Out of Total $60 Billion: IRD

$15 Billion Communications Mart Up for Grabs

NEW CANAAN, Conn. — The U.S. market for telecommunications service and equipment will reach $60 billion this year, with $15 billion open to competition, according to a market study released by International Resource Development, Inc. (IRD).

The 298-page report, "Telecommunications Market Opportunities in the United States, 1978" examines more than 90 separate telecommunications market segments and analyzes the opportunities, current market size, leading competitors and 10-year growth prospects within each segment.

Over the next 10 years, the overall market is expected to grow at about 4% annually, reaching $88 billion in 1988. However, those market segments able to compete with the Bell System will grow at much higher rates — 10% to 100% annually, IRD said.

The competitive portion of the market will increase from $15 billion to $30 billion annually by 1988, according to the report.

Both short- and long-term market opportunities are available, IRD said. Among the specific short-term growth areas it cited were medium-speed (2- and 3- minute) facsimile machines, specialty telephone devices, data multiplexers, satellite delay compensation units and value-added network services such as the "electronic mailbox."

Long-term growth markets include the cordless telephone computer conferencing services, satellite communications and electronic switching systems. Also, depending upon the outcome of the Execunet issue between MCI Telecommunications Corp. and the Federal Communications Commission [CW, May 15], the specialized carrier field could become an explosive market, IRD said.

The industry itself, according to IRD, is characterized by dozens of segments, with entry possibilities for the large, international telecommunications equipment vendors as well as for small, innovative specialty firms.

The likelihood that the Bell System will become more open to procurement from outside suppliers has, according to IRD's director of development, Stephen A. Caswell, "transformed the telecommunications market from a clubby environment to one of strong competition, which will increase during the next decade."

Further details on the report are available from IRD at 125 Elm St., P.O. Box 1131, New Canaan, Conn. 06840.

Orders & Installations

U-Haul International, Inc. has installed an Itel Corp. AS/5 Model 3 at its DP center. The system will provide on-line support for all of the firm's international DP functions.

John Fluke Manufacturing Co. of Mountlake Terrace, Wash., has taken delivery on a Graphic Data System manufactured by Calma Corp. The order is valued at $377,500.

The Huntington National Bank of Columbus, Ohio, has installed two Burroughs Corp. B4800 systems valued at $4 million in its Electronic DP Division.

The U.S. Air Force has installed an Itel Corp. AS/5 Model 3 as part of its program to upgrade the efficiency of the Aeronautical Systems Division headquartered at Wright-Patterson Air Force Base, Dayton, Ohio.

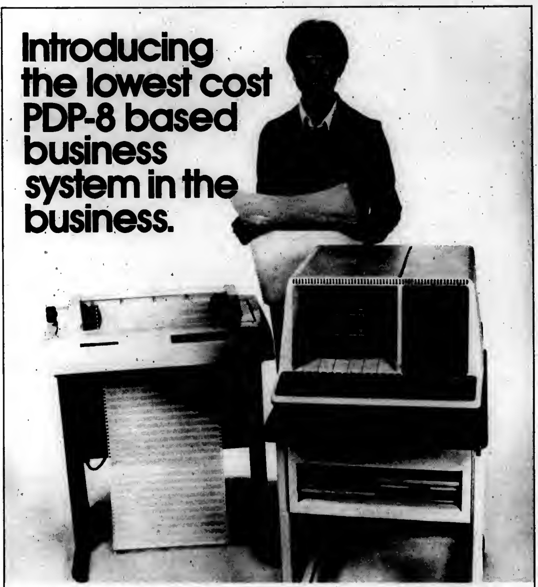
Pacific Northwest Bell Telephone Co. has ordered a Univac 1100/82 system, valued at $4.3 million for time-sharing applications.

Cambridge Thermionic Corp. of Cambridge, Mass., has ordered a 90/30 system from Univac to improve production scheduling and inventory management capabilities. The Sure Fit Products Co. of Bethlehem, Pa., has also ordered a 90/30 system to expedite the firm's business operations. Alterman Foods, Inc. of Atlanta has ordered a 90/30 system for on-line DP operations.

Computer Resources, Inc. has installed the first Micro-Measure, a printing response time monitor, at Standard Oil of Ohio in Cleveland.

Standard Federal Savings and Loan Association has installed two Burroughs Corp. B4800 systems at its main office in Troy, Mich. The systems are valued at $1.2 million.

'He's Really Been Feeling the Pressure Lately . . .'



Introducing the lowest cost PDP-8 based business system in the business.

If you're an end user who finds programming easy, or a small systems house, here's an offer you can't refuse. Quodata Corporation is offering a complete PDP-8 based business system—with the very latest technology—for only $9,990.

That's $2,400 less than you'll find anywhere else.

And QDP78 is an outstanding system. It features Q8OL, our own business-oriented language. Q8OL is compatible with DEC's DIBOL, but it's better. One reason is that it runs under the more flexible OS/8 operating system. FORTRAN IV, BASIC, and SORT/8 are also part of the system.

The QDP78 system is comprised of the latest LSI video display computer, the VT-78, and includes a processor, 32K bytes of MOS memory, a large 24 line by 80 character video terminal with upper and lower case characters, DECwriter II printer, dual diskette drives, and a portable mini-desk.

We have a limited number available, so call now: Richard Prendergast, (203) 728-6777.

quodata
Specialists in DEC Software
196 TRUMBULL STREET • HARTFORD • CONNECTICUT 06103.

Digital Communications Seen $35 Billion Mart

PALO ALTO, Calif. — The U.S. market for telecommunications transmission/network products will top $35 billion by 1985 with digital equipment capturing over 40% of the market compared with the 12.7% it held in 1975, according to a recent two-volume study released here by Comquest Corp.

The digital sector could be even larger, the report predicted, if the Bell System continues to convert to digital Class-5 electronic switching systems.

The study, "Digital Trends in Telecommunications," analyzes both the U.S. and Canadian markets, projecting the Canadian market at $5.5 billion by 1985, when 60% of the transmission/-switching network products will be classified as digital.

Although the number of companies offering products with digital technology is still limited in comparison with those committed to analog technology, most larger companies are working in both product areas, Comquest noted.

While digital technology is considered state-of-the-art today, the study predicted it will become status quo in the 1980s.

Systems using fiber optic transmission, common-channel interoffice signalling and digital speech interpolation will be affected by new digital transmission network equipment, the study claimed, with major innovation expected in memory, processor and analog interface device technology.

Electronic funds transfer, distributed data processing and electronic mail systems will propel the demand for digital networks.

Remote switching and satellite systems were other product areas forecast to increasingly use digitized methods.

The report segments the market into six areas — total U.S., Bell System, General Telephone, other independent telephone companies, other users and Canada.

While there is universal agreement that future telecommunications networks will be digital, there is less agreement on the timetable for implementation, the study concluded. The process of conversion will not be fully achieved in the U.S. until after the turn of the century, but somewhat earlier in Canada, it said.

Expansions

NEC Microcomputers Inc. has relocated its North American operations from Lexington, Mass., to an office complex in Wellesley, Mass. The 24,000 sq-ft space will house 70 persons.

Cambridge Memories, Inc. (CMI) is expanding its headquarters to a new 100,000 sq-ft building in Waltham, Mass. The facility will house the majority of CMI's manufacturing, engineering and marketing operations.

Cray Research, Inc. has broken ground for a 25,000 sq-ft headquarters building in Mendota Heights, Minn. The facility will house the firm's executive offices and marketing organization.

Data Printer Corp. is moving from Cambridge, Mass. to a 182,000 sq-ft facility in Malden, Mass., that will house production, engineering, quality control, test and laboratory space and corporate offices.

Logical Machine Corp. has moved its research and development and field engineering departments to a 12,600 sq-ft facility in the Moffett Park Area of Sunnyvale, Calif.

Sycor, Inc. has opened a 24,000 sq-ft addition to its Goldsboro, N.C., production facility.

Megatek Corp. will move its corporate headquarters and Graphics Group from Point Loma, Calif., to a new 24,000 sq-ft facility in San Diego's Sorrento Valley Industrial Park.

Arista Manufacturing Systems has opened its first West Coast office at 5310 Beethoven St., Los Angeles, Calif. 90066.

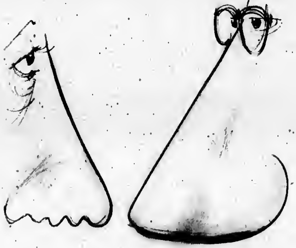
Codex Corp. of Newton, Mass., has opened a liaison office in Tokyo to provide direct marketing and technical support to Codex distributors throughout the Far East.

Contracts

Digital Associates Corp. has awarded to Memorex Corp. a $1 million third-party maintenance agreement covering printer systems supplied by DAC. DAC will sign service agreements with users, and Memorex will then provide service.

Midwest Telephone Co. of Minnesota has signed contracts with Stromberg-Carlson Corp. for two System Century Digital Central Offices.

Input Output Computer Services of Cambridge, Mass., has been awarded an Air Force Electronic Systems Division contract valued at about $1.8 million to provide and install seven data translators.



Why pay through the nose for printers when you can buy from CPS for less?

Let's face it. Dataproducts makes the best line printers you can get. Hands down.

That's why everyone from Hewlett Packard to Whachacallit Systems buys them, swaps the name plate, and sells them as their own.

We do the same thing. The difference is, we sell them for less.

The best interfaces.

We also sell the best interfaces available. Made by a well-known independent firm.

We have interfaces for virtually every system on the market. Including IBM Series/1, DEC, Data General, Interdata, Burroughs, HP, and you-name-it.

You can't buy better service.

Our full name is Computer Peripheral Services, Corp. We started as a service company. We have a full staff of technicians and engineers. We provide service nationwide. Even in remote areas. And people we serve think we're the best.

Dollars and sense.

We can help you shop for a system. And save you money. We can help you resell your old peripherals and replace them. And save you money. We can refurbish your equipment, or provide you spare parts. And save you money.

If you want to keep paying through the nose, go ahead. But if you want to operate a computer system at a sensible cost, call us. We can help.

I'm interested in **CPS.** Please contact me.

Name ____________________
Company ____________________
Address ____________________
City ____________ State ______ Zip ______
Telephone ____________________
My system is a ____________________
My Immediate need is ____________________

Computer
Peripheral
Services
Corporation

3187-F Airway Airway Avenue, Costa Mesa, CA
92626 (714) 540-0798

Total Communications Seen Next IBM Move

(Continued from Page 75)

create a revolution by evolution.

Competitive OEMs, PCMs and third-party leasing companies will be left in what will amount to only one small portion of the new industry: "data processing." DP, as we know it today, will become out of date in a period of a few short years.

That IBM and Satellite Business Systems (SBS) researchers are pursuing significant communications improvement is relatively well known. What may not be fully appreciated is the quantum jump that IBM's 1980s strategy may give to that company. In many respects, IBM's early '80s strategy may be the ultimate counterpunch — or the "industry ploy" — of the decade.

Change in Emphasis

When taken together, several facts lend support to the scenario. For one, IBM has recently changed its longstanding marketing strategy from emphasizing user rentals to emphasizing user purchases.

Price reductions, marketing priorities and low purchase/lease ratios now make purchases quite advantageous on commonly accepted rent vs. purchase parameters. This shift could simply represent efforts by IBM to meet purchase competition from other sources, to increase purchase income or to "lock in" rental customers.

On the other hand, and in many an expert's opinion, it may indicate IBM is planning an announcement that would cause dramatic obsolescence in the present IBM product line.

Another important fact adding fuel to the scenario is that substantial research and development expenditures have not really been evident in IBM product announcements for several years. Although this fact may suggest IBM's R&D efforts have not been as successful or dramatic as in previous periods, it may also indicate the real evidence of the bulk of these expenditures has not yet been announced.

Interviews with numerous industry experts produce several views indicating there may be in excess of a $2 billion R&D investment by IBM that is yet to show its face in the form of proportionately higher technology in IBM product offerings.

The so-called "30 series" merely represents a renameplating and repricing of equipment in the 370 line, which may be an indication that IBM is extending the 370 life span pending an early '80s announcement.

The 30 series machines have relatively low price/lease ratios, which traditionally suggest a short marketing life.

In addition, SBS is alive, well and proceeding toward implementation of a revolutionary voice, data, facsimile and teleconferencing communications network — probably by 1981. (SBS is a venture composed of subsidiaries of IBM, Comsat General and Aetna Life Insurance.)

Assuming the system works, the impact of the SBS concept may be one of the most dramatic technological developments in decades — if the DP industry provides information processing equipment that is capable of taking full advantage of SBS opportunities.

IBM's key role in SBS strongly suggests IBM will strive to provide a full spectrum of products that will both lead to SBS' success and ensure a substantial profit to IBM through its other divisions.

To accommodate such high-speed transmissions, high-speed processors will be needed. IBM may well fill that requirement with CPUs that are far larger than anything in use today.

Certain defense and space industry contractors are developing IBM-requested proposals for extremely small ground stations for high-speed satellite communications. These proposals may be aimed at creating antennae small enough for user company or IBM branch office installation.

The possibility of such installations, coupled with the extensive communications capability being built into the office products line, suggests the SBS concept may be applicable to far more companies than some analysts suggest.

Office Products

Also, IBM is quietly installing innovative communications capabilities in its office products line. While the full extent of these efforts is not yet known, the company is building high-speed communications capabilities into its word-processing equipment and, perhaps, into its advanced copier line.

For the present, few if any DP manufacturers have the ability to offer an integrated product line of word processing devices, advanced copier machines, small business computers and mainframe DP systems. IBM has long evidenced interest in exploiting this advantage under the concept of "information" processing.

This "A to Z" coverage in people, products and services currently in place is a weapons system that IBM can synergize via SBS. IBM would then be a "one-stop shop" with all the advantages of a *single* vendor — including transmission.

Effect on Lawsuit

IBM does not feel seriously threatened by the Department of Justice suit. Consequently, it is perfectly willing to pursue a course of minimizing competition through aggressive and innovative systems introductions.

Indeed, the introduction of a whole new era of "information networking" could leave the Justice Department with an antitrust lawsuit involving an essentially out-of-date industry.

One of the more fascinationg possibilities is that IBM's SBS activities will place the DP giant into direct communications competition with AT&T — itself the subject of antitrust claims by the Justice Department. It would indeed be ironic if IBM ended up asserting that its SBS foray and early '80s strategy was actually pro-competitive when viewed in the communications market presently dominated by AT&T.

Although IBM could make it considerably more difficult for PCMs and other vendors to compete for peripheral and 370 and 30 series replacement-level business, it has permitted this competition to continue at relatively regulated, and perhaps increasing, levels.

This could indicate IBM's "concern" over the antitrust implications of more predatory practices. However, IBM has seldom refused to regulate and stifle competition where it was clearly advantageous to do so.

Rather, IBM may be biding its time, waiting for the implementation of its early '80s counterpunch and encouraging its competitors to spend the bulk of their R&D dollars on potentially obsolete present-generation hardware.

IBM has not chosen to exploit or even offer significant competition in the so-called "distributed data processing" arena. This fact strongly suggests IBM may be planning to jump over the entire distributed data processing concept into the suggested multimedia networking system.

Many authorities fully expect IBM to make a major announcement in the early '80s. The announcement may involve a fourth-generation series, but problems with Josephson Junction and bubble memory technologies may be sufficient to prevent introduction of a fourth-generation mainframe (as we know it today) by that date.

The essence of the next step will be communications networking capability, using mixed voice and digital transmissions, rather than fourth-generation mainframes. Indeed, users and competitive vendors that focus only on fourth-generation hardware advances may well be left at the starting post — for the wrong race.

In pursuing this goal, IBM is conducting a revolution by evolution: hardware will continue to evolve, and fourth-generation technology will be introduced over a period of time as it becomes cost-effective.

The revolution, however, will occur in total information communications and in the linking of existing and future hardware, software and services in IBM's new worldwide information network.

This article is abstracted from CNReport's *April* issue. CNReport *is available for $20 per issue from International Computer Negotiations, 400 New York Ave., Box 364, Winter Park, Fla. 32790.*

THE $99 MODEM*

If you don't need dial-up and you're looking for an inexpensive local or in-house communication link that's RS-232 compatible, then consider a pair of our M-1 asynchronous short haul modems. Purdue University, Princeton University, NASA, the U.S. Navy and many others have found that our M-1's are a cost effective way to solve communication problems up to 10 miles or 9600 bps.

Rack mount configuration is available too. If you need synchronous transmission ask about our M-2 synchronous short haul modem.

Write or call us now for a data sheet and complete price information.

bo-sherrel co.
36443 SHELLEY COURT
NEWARK, CA 94560
(415) 792-0354

*100 Quantity

Revenues Rise 33% at DEC, Earnings Grow $9 Million

MAYNARD, Mass. — Digital Equipment Corp. reported revenues of $374.7 million for the third quarter, up 33% from the same period a year ago and producing earnings of $36.9 million or 87 cents a share. This compared with revenues of $282.7 million and earnings of $27.9 million or 72 cents a share in the year-ago quarter.

For the nine months ended April 1, the firm posted revenues of just over $1 billion and earnings of $95.8 million or $2.31 a share. In the previous year's nine-month period, revenues reached $728.2 million and earnings totaled $67.3 million or $1.73 a share.

Initial shipments of the 36-bit Decsystem-2020 and the 32-bit VAX-11/780 systems are under way, the firm reported.

End-user customer demand continued to grow in the third quarter, a spokesman said, while orders from resellers were sluggish, a reflection that these customers are working down their backlogs.

DEC completed the planned phase-over of leased facilities in Phoenix, Ariz., Colorado Springs, Colo., and Salem and Merrimack, N.H., to larger, company-owned buildings in those locations.

Delivery of products is typically within 90 days, the firm said.

Financial News

Comdisco Period Shows 23% Gain In Net Income

ROSEMONT, Ill. — Comdisco, Inc.'s earnings totaled $892,644 or 54 cents a share on revenues of $28.1 million in the second quarter, ahead of last year's quarterly results of $722,957 in earnings or 46 cents a share on revenues of $26.3 million.

Earnings growth over the same period a year ago was 23%, outdistancing sales growth of 6.2%. The increase was generated by the larger volume of computer leasing activity, improved earnings from cash fees generated by Comdisco's financial services subsidiary and the lower effective income tax rate, the firm stated.

Comdisco is a remarketer of used IBM 360 and 370 equipment, buying, selling and leasing three products.

A surge of activity is expected for the third and fourth quarters of the company's fiscal year when IBM begins delivering its 30 series processors, Comdisco said.

SDC Net Dives In Third Quarter

SANTA MONICA, Calif. — System Development Corp.'s (SDC) third-quarter earnings of $136,000 or 9 cents a share on sales of $36.5 million were down dramatically from year-ago results of $760,000 or 40 cents a share on sales of $33.2 million.

Nine-month results showed revenues at $103.9 million and earnings at $1.1 million or 70 cents a share, compared with 1977 nine-month postings of $94.2 million revenues and earnings of $1.8 million or 99 cents a share.

Heavy Start-Up Costs

The lower earnings in the third quarter were attributed to heavy startup costs on a long-term claims-processing program which SDCs chairman and president, Dr. George E. Mueller, claimed will generate revenues for the company for at least three years.

The firm reported new business bookings were at a record level.

Nickels & Dimes

General Automation, Inc. has finalized a comprehensive long-term loan agreement with three banks providing $25 million in working capital for domestic operations. In addition, the firm reported, the agreement also allows GA to negotiate an increase in foreign borrowing from the present limit of $6 million to a maximum of $10 million.

$ $ $

The board of directors of **Comdisco, Inc.** declared a dividend of 8 cents a share on its common stock for the second quarter ended March 31. The dividend is payable June 1.

$ $ $

Amdahl Corp. shareholders approved an increase of common shares from 10 million to 40 million. The company's board of directors approved a two-for one split and a quarterly dividend of 5 cents a share payable May 26.

$ $ $

Threshold Technology, Inc. recently established a principal banking relationship with Nordic American Banking Corp. of New York.

$ $ $

Boothe Courier Corp. recently made a cash tender offer to purchase 2 million shares (approximately 59%) of its common stock and all of its qualified stock options. The price offered for the common shares is $17 per share. The offer expired May 9.

The 370/138 and 370/148. Two great computers.

At Cooper Energy Services they saved $5,000 per month.

"Since we installed our Greyhound/148 on a 12-month lease, we have saved in excess of $5,000 a month," said Jim Goughenour, Director of Communications and Information Services, Cooper Energy Services, a division of Cooper Industries, Inc. "With our short-term Greyhound lease, we have achieved optimum cost-savings and flexibility."

We lease them for less. NOW!

If you've decided to install a 370/138 or 370/148, call Greyhound. If you've already placed an order for a 370/138 or 370/148, call Greyhound. If you have one of these computers installed, be sure and call Greyhound.

If you have a need for the computer now but you have been given a late delivery date, call Greyhound. We'll deliver one of our 138's or 148's when needed and still lease it at substantial savings.

If you order between now and June 15, you can take advantage of our special 1 to 5-year True Operating Leases* that can save you a substantial amount of money every month. And no matter whether you've just decided on a 370, or have taken delivery of one, we'll work out a lease plan that will pay off handsomely on the bottom line at the end of the year.

If you've chosen a 370/138 or 370/148, you've selected one of the best computers in the world. At Greyhound, we create the best lease plans in the world. So you can have their great computer... at our low price. Call today.

CALL: 800-528-6113

GREYHOUND COMPUTER CORPORATION

Greyhound Tower, Phoenix, Arizona 85077

**True Operating Leases – Walk-away at end of term... Without penalties or residual guarantees*

CSC Year Earnings Rise As Quarter Net Grows 23%

EL SEGUNDO, Calif. — Fourth-quarter results for Computer Sciences Corp. (CSC) rose 23% over year-ago amounts as earnings reached $3.9 million or 28 cents a share on revenues of $77.5 million.

In the year-ago quarter, CSC posted earnings of $3.1 million or 21 cents a share on revenues of $63.2 million. All 1978 figures are unaudited.

The firm reported year-end revenues of $276.9 million and earnings of $13.9 million or 97 cents a share, up from revenues of $234.7 million and earnings of $11.6 million or 80 cents a share in 1977.

Contract services provided to commercial and government clients generated revenue of $199.1 million, up from $177 million the year before, with sales to the federal government leading growth.

The other major source of revenue came from CSC's Infonet timesharing operation, the firm said, which increased to $77.8 million this year, up 35% from last year.

Initial costs of developing Infonet's European markets and lower margins on other data services operations reduced operating margins for the Data Services Group as a whole, the company reported, but margins for this year were greater than in 1977.

Data processing wizards, come flourish & prosper.

1

Do you find yourself in a job where you can't concentrate on design problems because of implementation and maintenance duties... where you cannot keep up with the latest technology because your firm is moving in a narrow direction ...where you'll have to trade your technical role for an administrative role if you want continual substantial salary increases?

2

Change. Join us. We offer a stimulating position which solves all three problems.

We are an international firm with a rapidly expanding $10 million data processing consulting practice.

As a member of our consulting team, you would help clients apply the latest technology to solve their problems. You would not be involved in implementation (programming)...only in design and evaluation.

You will be in a position to stay abreast of the latest technology. In fact, your work will demand it.

3

The starting salary is $20,000—$28,000, depending on your qualifications.

As a successful, technically-focused consultant, you could expect your compensation to surpass $60,000 (in current dollars) within 10 years.

4

This position is based in St. Louis. About half your work would be in other cities; however, you could count on being home on weekends.

5

The basic requirement is that you possess a readily marketable technical expertise. To us, this means that you have an exceptional grasp of the underlying concepts and that you have repeatedly produced innovative, effective results.

Your expertise could be in:
- Operating systems
- Data base systems
- Data communications systems
- Hardware/software monitoring
- Long-range EDP requirements planning
- Distributed systems
- Computer workload scheduling
- EDP transfer pricing
- Data system security—contingency planning

In addition, you must have outstanding written and oral communication skills and be able to devote a tremendous amount of energy to your work.

6

In considering you for this position, we must estimate how marketable you would be as a consultant. To help us, please be sure that your resume ennumerates for each project cited: the problem, your specific role, and the resulting benefits.

We would greatly appreciate a brief cover letter outlining the types of consulting problems you would like to tackle.

We will handle all correspondence in strictest confidence and promise a prompt reply. (To dispel any concern that your firm may have placed this ad, consider that our St. Louis office is administratively referred to as #504.)

We look forward to hearing from you. Together, we could perform great magic.

Box 8846, Saint Louis, Mo. 63102

We are an equal opportunity/affirmative action employer, and we especially encourage women and members of minorities to apply

Sperry Quarter Revenues Hit $1 Billion for First Time

NEW YORK — Sperry Rand Corp.'s fourth-quarter revenues topped $1 billion for the first time and earnings rose 24.6% to $59.5 million or $1.53 a share. This compares with revenues of $897 million and earnings of $47.8 million or $1.25 a share in the year-ago quarter.

Year-End Earnings

Year-end earnings totaled $176.6 million or $4.60 a share on revenues of $3.6 billion, up 12.6% from 1977 earnings of $156.8 million or $4.11 per share on revenues of $3.2 billion.

Computer revenues for the year rose 18% with fourth-quarter revenues increases reported at 33%. The firm attributed the gains to the heavy demand for the large-scale 1100/80 series introduced about a year ago.

The firm also reported bookings up 16% and backlog orders up 18% over last year-end totals.

Financial News

CA Quarter Net Gain Slow

IRVINE, Calif. — Computer Automation, Inc. reported a sales increase of 42% for its third quarter, but expressed disappointment at a sluggish 9% increase in earnings.

The third quarter ended April 2 with earnings of $1.7 million or 89 cents a share on record sales of $17 million. Third-quarter 1977 results showed net income of $1.6 million or 82 cents a share on sales of $12 million.

Nine-Month Results

For the nine months, the company posted sales of $43.6 million and earnings of $4.6 million or $2.32 a share compared with sales of $29.9 million and earnings of $3.5 million or $1.78 a share in the year-ago period.

D.H. Methvin, CA president, attributed the profit margin decline for the quarter on startup costs for the company's minicomputer manufacturing plant in Dallas; costs of marketing expansion in Europe; and heavy expenditures for new product development.

Further, above-average levels of receivables and inventories required the firm to use its revolving bank line, resulting in increased interest expense, he added.

Centronics Net Hits Record

HUDSON, N.H. — Centronics Data Computer Corp. said unusually high demand for two new product lines contributed to record third-quarter earnings of $3.6 million or 62 cents a share on revenues of $19.6 million.

Year-ago third-quarter earnings totaled $3.2 million or 53 cents a share on revenues of $14.8 million.

Although unaudited, nine-month results for 1978 show sales at $53.4 million and earnings at $10.1 million or $1.74 a share, topping 1977 sales of $42 million and earnings of $9.1 million or $1.51 a share.

Series 700 Demand

According to Robert Howard, president of Centronics, "The Series 700 is now our largest product line in number of machines and dollars of sales and is at the start of its production life cycle. Demand for our 700 and 6000 series has caused us to become production-limited.

"This situation will be relieved with the July opening of our new assembly building in Hudson and our Irish plant expansion, which will be completed in August," he noted.

Earnings Soar 92% In STC First Quarter

LOUISVILLE, Colo. — Storage Technology Corp. (STC) boosted net income during the first quarter by 92%, earning $3.5 million or 65 cents a share on revenues of $54.2 million.

This compared with earnings of $1.8 million or 37 cents a share on revenues of $32 million in the 1977 period.

Commenting on first-quarter results, President Jesse Aweida said, "STC is in the most rapid growth phase of its history. New orders and backlogs continue to be at an all-time high."

New Registrations

WAVETEK, 9045 Balboa Ave., San Diego, Calif 92123, filed to register 42,981 shares of common stock. No underwriter is involved

IBM, Armonk, N.Y. 10504 filed to register 25,000 shares of capital stock. No underwriter is involved

DATAPOINT CORP., 9725 Datapoint Drive, San Antonio, Texas 78284, has filed to register 600,000 common shares from the company and 11,900 shares from a selling shareholder and warrantholder. The issue is being underwritten by a syndicate headed by Kidder, Peabody and Co., Inc

HONEYWELL, Inc., Honeywell Plaza, Minneapolis, Minn 55408, filed to register 60,000 shares of common stock and $5 million of participations. No underwriter is involved

PRIME COMPUTER, INC., 40 Walnut St., Wellesley Hills, Mass 02181, has filed to register $15 million of subordinated debentures due 1993. Underwriter will be Smith Barney Harris Upham & Co., Inc., 120 Broadway, New York, N.Y. 10005

NCR CORP., 1700 S. Patterson Blvd., Dayton, Ohio 454/9, filed to register 1.3 million shares of common stock. No underwriter is involved

COMPUTERIZED AUTOMOTIVE REPORTING SERVICE INC., 210 Automation Way, P.O. Box 235, Birmingham, Ala 35201, has filed to register 46,500 shares of common stock. No underwriter is involved

COMPUTER TRANSCEIVER SYSTEMS, INC., East 66 Midland Ave., Paramus, N.J. 07652, filed to register $1,175,000 of 10% subordinated debentures due 1988. No underwriter is involved

CAMBRIDGE MEMORIES, INC., 12 Crosby Drive, Bedford, Mass 01730 filed to register 100,000 shares of common stock. No underwriter is involved

HEWLETT-PACKARD CO., 1501 Page Mill Road, Palo Alto, Calif 94304 has filed to register 1 million shares of common stock. Underwriter: Morgan Stanley & Co., Inc., 55 Water St., New York, N.Y.

POSITION ANNOUNCEMENTS

We can give you 3 good reasons to call Robert Half for data processing positions:

1. Robert Half has been in business for about 30 years. Can you name an EDP personnel service that's been around longer?

2. Robert Half specializes. We've been an integral part of the data processing community through all its generations.

3. Robert Half's offices are staffed by experts in the EDP field.

and if 3 reasons aren't enough, we can give you 55 more:

55 offices. Robert Half is a network throughout the U.S., Canada and Great Britain. One call and you've searched the local market ... or the world.

and if 58 reasons aren't enough, we can give you Half a reason more:

Robert Half. Where integrity is a lot more than just HALF.

ROBERT HALF PERSONNEL AGENCIES

Look in the white pages.

ENGINEERS

software designers
systems engineers

MAKE SIGNIFICANT CONTRIBUTIONS IN THE 'NEW COMPUTER INDUSTRY'

CALL TOLL FREE (800) 323-1966

In Illinois (800) 942-0491
Monday thru Friday from 8 am to 5 pm cdt

Let us tell you about the changes that have taken place, and those about to take place in the massive telecommunications field. We started preliminary work in the early '60's. Today, digital processors are controlling the telephony process in numerous applications. A major portion of the challenge lies ahead: to conceive, develop and provide more sophisticated electronic telecommunications systems. We're paralleling the advances in the computer industry, and moving forward in state-of-the-art areas unique to our needs. Talk with us about the exceptional growth opportunity in the "new computer industry".

APPLIED RESEARCH

Performs research on circuits, systems and subsystems and related hardware and software in order to provide management with information on concept feasibility and estimated system cost for design and development. Efforts involve providing existing services with new techniques and/or new services on existing equipment.

LONG RANGE PLANNING

Long Range Planning activities involve research studies on a wide variety of subjects related to the telephone communications industry. These studies include such areas as data communications, new technology, new services, future switching networks, evaluation of new switching techniques and review of the impact of political, economic and regulatory considerations. Intent is to provide well founded counsel and recommendations to upper management on future development programs and courses of action.

SYSTEMS DESIGN

***New Feature Design** — Plan and develop the future hardware and software evolution of current large scale fully stored program controlled switching systems. Develop new features for existing equipment, study new features impact on existing systems; and estimate the development costs and requirements.*

***Product Design** — Design advanced fully stored program controlled systems for telecommunication application. Develop large scale software programs in an on-line, real-time environment and related digital hardware using CMOS, **Schottky,** TTL as well as Static and Dynamic MOS.*

***International Design** — Develop design philosophy and Architecture Definition of switching systems for international markets. This involves high level design structure development and detailed studies of critical problem areas. Define specific design implementation tasks, review progress and coordinate developments with implementation teams abroad.*

SOFTWARE DESIGN

***Data Base Software** — Responsible for logical and physical data base design and implementation related to telecommunications systems. Develop programs which automate the generation of data base contents for these systems in an IBM 370 environment using PL 1*

***Support Software** — Involved in compiler, assembler, simulator maintenance and enhancement as well as other IBM 370 software developments. Support effort is related to micro and large processor developments.*

***Application Software** — Large scale development in telephone system real-time control. Diagnostic and fault recognition software; administrative software involving real-time data base administration, switch and network overload procedures as well as executive software*

SYSTEMS CONTROL AND TESTING

Development and execution of comprehensive test plans to evaluate the performance of large stored program switching system prototypes. Execute configuration management on all hardware, software, and components and maintain project control for all activities. System evaluation performed on both laboratory prototypes and initial field site locations

If you have in-depth expertise in one or more of these areas, and a BS, MS or PhD in Electrical Engineering, Computer Science, Math or other appropriate engineering discipline as well as an interest in moving forward with a challenging new frontier in computer technology talk with us.

If unable to call, send resume including recent salary history to:

Manager of Technical Employment
Dept. 471 A6
GTE AUTOMATIC ELECTRIC LABORATORIES
400 N. Wolf Road
Northlake, IL 60164

An Equal Opportunity Employer M/F

GTE AUTOMATIC ELECTRIC LABORATORIES

MAKE THE SWITCH!

WHAT IS YOUR TRUE WORTH?

It's a seller's market for EDP professionals ... you are the seller. Because of this you should take a "hard look" at what your present position offers you ... salary, advancement, etc.

We offer assistance in evaluating your present position. Just send us your resume, or a note outlining your experience, no obligation to you ... we will call you to discuss your objectives with you.

Prog/Analysts	$15-22	Mgrs S/3 RPG-II	$16-23
Systems Anals	$20-25	Programmers	$15-22
Sr. Anal/Prj Mgr	$22-30	EDP Auditors	$18-22
Tech Sup/Sys Prog	$20-30	Sci./Mini Prog	$16-23

NATIONWIDE--FEE PAID--CONFIDENTIAL

For more information, contact or send resume to:

Mark Fuller
CADILLAC ASSOCIATES, INC.
32 W. Randolph St., Chicago, IL 60601
(312) 346-9400

HOUSTON NEEDS YOU

Programmer Analysts are in great demand in the fun and sun city of Houston. The economy is great and so are the opportunities within the Energy, Mfg. and Financial fields. DOS or OS and any IMS a real plus. Salary ranges from $16,000 to $28,000 depending on education and experience. If you feel you qualify call Jim Fleming COLLECT (713) 961-3271 at

ROBERT HALF
PERSONNEL AGENCIES, INC.
4801 Woodway, Suite 231W
Houston, Texas 77056

PROGRAMMERS AND ANALYSTS

Free Employment Service

Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

PROGRAMMING

Systems Programmers

We are a large DOS/VS shop with extensive CICS and RJE networks, converting to OS/VS on our IBM 370/158. We are seeking systems programmers with experience in O/S, JCL, utilities and well versed with BAL. Experience with VM, CICS, UCC-TWO and PL/I is an added plus.

Syntex is a multi-national pharmaceutical company, headquartered in the Stanford Industrial Park, offering excellent benefits including dental and matching funds savings plan

For immediate consideration, please submit resume with salary history to Mr David Milner, Job No CW 7310, Syntex Corporation, 3401 Hillview Avenue, Palo Alto, California 94304 We are an equal opportunity employer

SYNTEX

PROCESS CONTROL SUPERVISOR

A progressive, fine paper manufacturer located in central Wisconsin has an excellent opportunity available for an experienced Process Control Supervisor BS degree in Paper Science and Engineering, Chemical Engineering, Chemistry or Computer Science, plus a minimum of 5 years of working experience in a related area Additional education beyond a BS degree in Business Administration or the Sciences would be advantageous This person must have a working knowledge of process control systems and computer software development.

This person will oversee the effort to provide continuous operation of the process control system and will assist Production, Maintenance, and Technical departments in the development and implementation of new process control operations and applications

Excellent salary and fringe benefits available Send resume and salary requirements to

Bert Johnson
Employment Manager
CONSOLIDATED PAPERS INC.
P O Box 50
Wisconsin Rapids, Wisc 54494

An Equal Opportunity Employer

Consolidated

SYSTEMS PROGRAMMER

The Department of Surgical Instrumentation has position available for person to implement a patient monitoring system employing micro processors and a minicomputer.

BS Degree in Electrical Engineering, Computer Science or equivalent with knowledge of micro processor interfacing, computer hardware and digital electronics. Strong background in assembly language programming desired.

Excellent Starting Salary commensurate with experience along with an Outstanding Benefit Program. Send resume in confidence to Mr. Phil Olson

Rush Presbyterian St Luke's Medical Center

1725 W. Harrison St.
Chicago, IL 60612
an affirmative action
equal opportunity employer m/f

EDP professionals!

Expand your horizons in San Diego

Immediate openings—software and hardware

- **DISTRIBUTED NETWORK ARCHITECTURE**
  Design and application of an advanced communications network architecture to meet distributive processing needs of the 1980's. Experience areee of interest: teleprocessing, system architecture, network processing, transaction processing.
- **TRANSACTION PROCESSING**
  Design/Implament transaction processing facilities—parallel tasking, inter-process communications, system recovery. Project Leader position available.
- **INTERACTIVE PROCESSING**
  Design/Implement interactive processing facilities of large, general-purpose O/S—text editor, interactive compilers, program development tools.
- **DATA BASE**
  Design/Implement DBM software. Experience desired in relational, network, or hierarchical data base internals. Project Leader position available.
- **PERFORMANCE MEASUREMENT & ANALYSIS**
  Use analytical and empirical tools to identify tuning opportunities and evaluate design alternatives in areas such as distributed processing, data base and transaction processing.
- **OPERATING SYSTEM DEVELOPMENT**
  Design/Implement multiprogramming, virtual storage O/S on uniprocessor and multiprocessor configuration.
- **COMPILER DESIGN/DEVELOPMENT**
- **FIRMWARE**
  Project Lead/Analyste
- **DIAGNOSTIC PROGRAMMING**
  Design, develop programs to support software testing, release and repair.
- **TEST SYSTEMS DEVELOPMENT**
- **MIS APPLICATIONS**
- **SOFTWARE QUALITY ASSURANCE**
- **CONFIGURATION MANAGEMENT**
  Design, Test, Integration
- **MICR PROOF OF DEPOSIT SOFTWARE**
- **DESIGN AUTOMATION**
- **SYSTEMS ARCHITECTS**
  Future EDP Systems

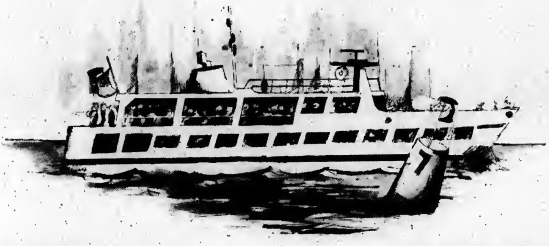
Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employee and dependents. Please send resume, including salary history and experience, to the Professional Placement office at the address below:

NCR
Complete Computer Systems

ENGINEERING AND MANUFACTURING
16575 W. Bernardo Drive, San Diego, Calif. 92127
An equal opportunity employer

Come Aboard!

We think you'll want to stay!



Cruise Boston Harbor with Us. If you're a talented engineering professional in Boston for Electro '78, join GTE Sylvania's Electronic Systems Group (ESG) for a Career Cruise of Boston Harbor Wednesday or Thursday, May 24 or 25. It's our way of introducing you to the many career opportunities in our world of communications.

Looking for a New Position Can Be Fun. At least we think so, and we're out to prove it. In this informal, shipboard setting, you'll have an opportunity to speak with representatives of our 8 operations about the world of opportunity we offer. And while the ship explores the harbor, you can have an informal interview and explore GTE Sylvania. We're a leader in the communications field with significant involvement in almost every aspect of modern communications technology and exciting new projects underway worldwide.

And Your World Can Be Expanded. If you're a software, systems, hardware, or reliability engineer, we can offer you involvement with some of the most advanced technology in communications. And we can offer that involvement with a choice of lifestyles both on the East Coast and the West Coast.

Electro '78 Career Cruises

Qualified software, systems, hardware, and reliability engineers are cordially invited to reserve space on one of our Career Cruises of Boston Harbor.

Cruises will depart three times a day for two days during Electro'78:

WEDNESDAY, MAY 24
THURSDAY, MAY 25
3 pm, 6 pm & 9 pm

Space on these Cruises is limited. To arrange to join us, please call Jan Hewitt at (617) 449-2000 prior to or during Electro '78, let her know what your interests are and when you would like to come aboard.

If you're unable to meet with us during Electro '78, you are invited to forward your resume to Jan G. Hewitt, GTE Sylvania, Electronic Systems Group, 99 "A" Street, Needham, Ma 02194.

ESG Is a Multi-Faceted Organization. Our capabilities cover a major segment of the electronics and communications field encompassing the following: telephone systems; satellite systems, target detection, tracking and defense systems; electronic warfare systems; radio communications, navigation, and intelligence systems; and support systems.

In our world of communications, you don't have to move out to move up. When your objectives change and your abilities expand, you'll find your next level of achievement is waiting for you elsewhere in our world.

There's A Place For You. So, no matter what your area of communications expertise, if you're looking for an organization with global scope, international involvement, and state-of-the-art communications technology, you're looking for the Electronic Systems Group. Now that you've found us, find your place in our world during a Career Cruise.

GTE SYLVANIA

GTE Sylvania
Electronic Systems Group...
A World of Communications.

As an equal opportunity employer M/F, we encourage minority and female applicants

OPPORTUNITY

add dimension to your future

"Upon receiving my BS in Computer Science, I wea hired to work in Software Maintenence. I progressed to project leader and em presently manager of Software Sustaining Program. At Sperry Univec, your personel contributions ere rewarded"

SYSTEMS SOFTWARE DEVELOPMENT

Sperry Univac has immediate professional positions available for select individuals directly involved with mini-computer development. A position with Sperry Univac offers not only technical responsibility, but the opportunity to grow with it.

New Systems Research and Development projects are starting now...

- State-of-the-art Operating Systems for Interactive, Real-time, and Batch Environments.
- Distributed Data Base Management Systems.
- On-line System Diagnostics.
- Sustain and Enhance Present Software.
- High Performance Business and Scientific Compilers.
- Advanced Data Communications Software.

Diagnostics Analysts

Individuals will be members of hardware/software design team involved in mini-computer test systems development. Positions will include project responsibility for all phases of assembly language and microprogramming language implemented programs and development of system level testing and fault-isolation software.

Data Communications Analysts

Design software and be responsible for the implementation of asynchronous and synchronous protocols. Design transaction oriented systems, Distributive Communications Architecture, and front-end processors. Project Manager opportunities. Direct assembly and language experience required.

Data Communications Analysts

Estimate time and cost of Data Communications software for customers. Evaluate customer software RFQ/RFP's, design creative solutions for customer's needs, and provide state-of-the-art technical leadership.

Software Applications Analysts

Conduct pre/post sales software support for Mini-Computer Operations products, including benchmarks, performance analysis and competitive analysis. Requires direct experience in Operating Systems, Data Base design and high level languages.

Special Software Design Analysts

Provide real-time systems programming, special interfaces/device drivers, diagnostio hardware/software, project control, cost estimates and assembler languages.

Performance Mesurements Analysts

Establish procedures and develop necessary tools to perform the system measurements of our on-line transaction oriented system and analytic and simulation modeling.

Custom Applications Analysts

Position responibilities include industrial automation, distributed processing networks, assembly and high level language, on-line transaction systems, Data Base Management Systems, proposal writing, specifications design and project management.

Operating Systems Analysts

Design and development of data communications software for operating systems development, DBMS design/implementation, use of DBMS in distributed environments, on-line teleprocessing and line and network protocols.

Software Sustaining Analysts

Providing enhancement and support of operating systems, Telecommunications systems and Fortran Compliers.

In addition to the excellent opportunity for career advancement, Sperry Univac will offer you an attractive salary and benefits program. Please forward your resume to the address below, or phone Employment at 714/833-2400 for additional information.

SPERRY UNIVAC

MINI-COMPUTER OPERATIONS
2722 Michelson Drive, Irvine, CA 92713
An Equal Opportunity Employer M/F

INTERNALS

OS MVT SYSGEN $22M
1 yr. exper. needed-will trein on 370/k68 MVS internals.

VM INTERNALS $26M
TSO $25M
Seak internals of TSO- on IBM OS

HARD. ANALYST $27M
2 yrs. NCP - 3705 network design.

CDC SCOPE $26M
Needs KRONOS-Accept SCOPE Expar

PERFOMRANCE ANALYST $24M
Seek exper. using probe & Exits

CICS GEN'S $26M
Must be abla to write effectively and prefer OS internal exper.

EDP AUDITOR $15 42M
We heve over 80 openings.

EXEC 8 .... $25M
Customar interfeca position desires 2+ yrs. exper. on 1100.

NJI or NJE $25M
NJI/NJE and any OS expar. needed.

DOS to OS $18M
Seek person to be Mgr. in 370/148 Shop. Must Sysgen Sys.

DOS-CICS

We have over 50 opanings for internals exper. Mini, Honeywell and others: Call Skip.

EDP SEARCH

P.O. Box 12566
Okla City, OK 73157
(405) 525-8833

BROWN & ROOT, INC.

Brown & Root, the number one Engineering and Construction firm in the world has embarkad on a large scale expansion of Computer Services.

We have to offar professional and financial growth opportunities in the Business Systems group, including such positions as:

Systems Project Managers for:

- Cost Accounting & Estimating Systems
- Financial/Accounting Systems
- Project Control Systems
- Material Managemant Systems
- Project Generel Menagement Systems
- CPM/PERT Processors
- Information Systems Analysts

If you are interested in joining a dynamic organization, call collect or send your rasume in confidence to:

Pam Wright
P.O. Box C 33-948
Houston, TX 77001
(713-678-6191)

Brown and Root, Inc. and Associated Companies/serving progress the world over/a Halliburton Company.
Equal Opportunity Employer M/F

PROGRAMMER/ ANALYST II

$16K Start

Fremont-Newark Community College District, OHLONE COLLEGE, is accepting applications for the above position. BA/BS degree in Computer Science or its equivelent & 1 yr. related experience required. Applications may be obtained from the Personnel Office, P.O. Box 2909, Fremont, CA 94538, or by calling (415) 657-2100, Ext. 233. DEADLINE FOR APPLICATIONS IS FRIDAY, MAY 26, 1978, 5 P.M.

An Equal Opportunity
Title IX Employer
Thru Affirmative Action

POSITIONS NATIONWIDE

CALL TOLL FREE 800-426-0342

Data Base & Soft ADM To 34K
BS/MS EE, PDP 11, MACRO 11 and real time systems experience.

COBOL PROGS To 24K
OS exp. in mfg., refining, retail & others.

SYSTEMS PROGS To 30K
Need PDP 11 or IBM O/S, DOS/VS exp.

PROJ ANALYSTS To 27K
IMS or IDMS experience-several openings.

BILL ISGRIG

PARKER PAGE ASSOCIATES

P O Box 12308
Seattle, WA 98111
Offices in Wash., D.C., Chicago, Atlanta, Portland, Or

D.P. PROFESSIONALS

Critical needs exist in the Southwest & Southeast for Programmer/Analysts with 1 to 3 years experience in 370 ALC or COBOL. With demand so high, our client companies offer rapid but stable career advancement, strong benefit packages, company-paid moving and interview expenses and they pay our fee.

DUNHILL of FORT WORTH

Personnel Consultants
901 Ridglea Bank Bldg., Ft. Worth, TX 76116
(817) 732-8191

ANALYST/PROGRAMMER AND COMPUTER PROGRAMMERS

To work in designing and developing on-line applications. COBOL experience required. Send resume, salary history, and salary requirements, by June 9, 1978, to:

Kan Van Kammén
Mgr. Data Processing
Gateway Technical Institute
3520-30th Avenue
Kenosha, WI 53141
An Equal Opportunity Employer

COMPUTER PROGRAMMER

$1,064-$1,235

Full time permanent position to develop computer programs and operate an IBM 360/30 computer. Must have minimum one year full time experience in operations/programming in COBOL/RPG II under DOS. District paid fringe benefits. Apply Hartnell College Business Office, 156 Homestead Ave., Salinas, Ca. 93901. DEADLINE: Friday 5/26/78.

ATTENTION SKIERS

Reno based Gannatt/West, 30 minutes from the nearest slope, has an immediate opening for a programmer/analyst position. You will be responsible for development, installation and maintenance of business application software at local newspaper sites. We are using DEC PDP 11/60 and 70's with RSTS and Basic Plus 2.

An unusual opportunity for the right person. Excellent growth potential. Competitive salary and fringe benefits. Some travel necessary. Send resume and salary requirements to:.

EDP Director

Gannet/West

P.O. Box 462
Reno, Nevada 89504

ACADEMIC & GOVERNMENTAL COMPUTER CENTER MANAGEMENT

SCT's '77 Was A Great Year 1978 Will Be Even Greater Discuss Your Tomorrow...NOW!

Systems & Computer Technology is the national leader in the $100 million plus industry of higher education computer Facilities Management. Our growth in billings continues at an exceptional rate since our founding in 1968. Today there are over 500 employees across the U.S.A.

DUE TO THIS GROWTH WE HAVE IMMEDIATE NEEDS FOR:

SR. MANAGER, ACADEMIC FINANCIAL SYSTEMS - Lead and direct multiple projects. Technical ability to design and develop large scale fund Accounting financial systems. Executive level interface skills required.

MANAGERS, SOFTWARE DEVELOPMENT (2) - Multi-project responsibility especially with large scale equipment. Hands-on knowledge of installation of MIS Integrated Systems.

PROJECT MANAGERS, STUDENT INFORMATION SYSTEMS - Direct major projects. Technical ability in design implementation and completion of major systems. User interface skills required.

PROJECT MANAGERS, PAYROLL/PERSONNEL SYSTEMS (2) - Direct large scale projects. Technical ability in design, program specification, systems testing and translation of requirements to detail specifications. Higher Education experience and user interface skills required.

SYSTEMS ANALYSTS, GENERAL LEDGER - 4 to 6 years, (inc. COBOL Prog.) in University Fund Accounting G/L experience Technical ability in Design, Implementation, Installation and Completion of System.

SYSTEMS ANALYSTS, PAYROLL/PERSONNEL - 4 to 6 years. (inc. COBOL Prog.) in academic Payroll/position control experience. Technical ability in design, Implementation, Installation and Completion of Systems.

SYSTEMS PROGRAMMERS (2) - HONEYWELL 6000 Series & CDC Large Scale, 2 to 4 years of Systems Generation and Maintenance.

PROGRAMMER/ANALYSTS (5) - 2 to 3 years of COBOL, JCL, on 3rd & 4th generation equipment.

SCT OFFERS A NATIONWIDE HARDWARE CONFIGURATION THAT CONSISTS OF

Honeywell 6000's, Univac 1100 + 9000 series, CDC Large Scale - Itel AS/4, IBM 370 series

Positions are located in both urban and semi-rural areas of: Massachusetts, Florida, Ohio, Illinois, California and suburban New York City/Philadelphia.

SCT's various development plans offer a structure for professional growth, geared toward top positions in Facilities Management, Software Design & Implementation, Marketing and EDP Consulting. Besides the most up-to-date Hardware and Software, we offer High Visibility positions, 3 weeks vacation, first year, company paid medical and dental, stock participation and company paid relocation.

Please send letter or resume, specifying salary, or

CALL COLLECT: MR. W. DRANSFIELD

Monday Through Thursday

10 AM to 2 PM EST - 215-692-7990
7 PM to 9 PM EST - 215-667-6781

SYSTEMS & COMPUTER TECHNOLOGY CORPORATION

Seven North Five Points Road
West Chester, PA 19380

Equal Opportunity Employer M/F

Want to be part of the world's most visible computer company? Join NCR.

NCR built the Universal Product Code computer market. More than 250,000 computerized checkout terminals have already been installed world-wide. Demand for this remarkably successful application of our pioneering work in mini and microprocessor technology will be accelerating sharply.

Our Engineering & Manufacturing Division - the leader in ECR/POS intelligent terminals and CPU link-up - is growing rapidly; and retail acceptance of our new generation C-2140 multi-microprocessor is creating unprecedented ground floor opportunities. If you would like a key role in the world's most visible business computer company, and have a background in one or more of the following areas, contact us at once.

REAL-TIME PROGRAMMERS

- Microprocessor Software (Assembly Level)
- Operating Systems Design
- I/O Drivers
- Diagnostics
- Communication Protocols (SDLC)

DEVELOPMENT ENGINEERS

- State-of-the-art mass memory devices and PMOS, EMOS, CMOS, MSI and LSI technologies
- 8080 based microprocessor design
- Multiprocessor systems architecture
- I/O device (wand readers, cassettes, CRTs)
- Computer controlled test sytsems design

There are additional openings for:

COMPONENT-RELIABILITY ENGINEERS and QUALITY CONTROL ENGINEERS with BS degrees in EE, CS or related disciplines.

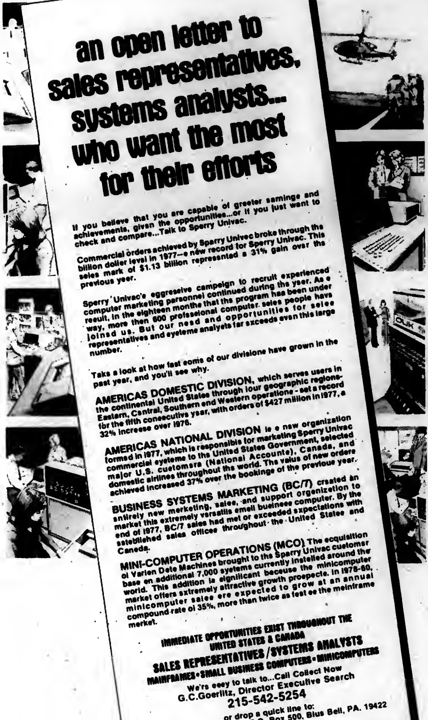
NCR/Millsboro is located in the heart of the "Delmerve Peninsula" - one of the most ideal living areas on the Eastern seaboard. We're minutes away from wildlife preserves and the nation's finest beaches, and are within 3-hour drives of Philadelphia, Baltimore and Washington.

Run NCR through check-out by calling Ron Tull, Collect at (302) 934-8111 (Weekdays 8:00 a.m. to 4:00 p.m.)

Or, rush resume, together with earnings history and requirements to: Ron Tull, Dept. CW515, Engineering & Manufacturing Division, NCR Corporation, P.O. Box 607, Millsboro, Delaware 19966.

An Equal Opportunity Employer NCR

When it comes to career opportunities ... NCR MEANS BUSINESS.



an open letter to sales representatives, systems analysts... who want the most for their efforts

If you believe that you are capable of greater earnings and achievements, given the opportunities...or if you just want to check and compare...Talk to Sperry Univac.

Commercial orders achieved by Sperry Univac broke through the billion dollar level in 1977—a new record for Sperry Univac. This sales mark of $1.13 billion represented a 31% gain over the previous year.

Sperry Univac's aggressive campaign to recruit experienced computer marketing personnel continued during the year. As a result, in the eighteen months that the program has been under way, more than 600 professional computer sales people have joined us. But our need and opportunities for sales representatives and systems analysts far exceeds even this large number.

Take a look at how fast some of our divisions have grown in the past year, and you'll see why.

AMERICAS DOMESTIC DIVISION, which serves users in the continental United States through four geographic regions-Eastern, Central, Southern and Western operations - set a record for the fifth consecutive year, with orders of $427 million in 1977, a 32% increase over 1976.

AMERICAS NATIONAL DIVISION is a new organization formed in 1977, which is responsible for marketing Sperry Univac commercial systems to the United States Government, selected major U.S. customers (National Accounts), Canada, and domestic airlines throughout the world. The value of new orders achieved increased 37% over the bookings of the previous year.

BUSINESS SYSTEMS MARKETING (BC/7) created an entirely new marketing, sales, and support organization to market this extremely versatile small business computer. By the end of 1977, BC/7 sales had met or exceeded expectations with established sales offices throughout the United States and Canada.

MINI-COMPUTER OPERATIONS (MCO) The acquisition of Varian Data Machines brought to the Sperry Univac customer base an additional 7,000 systems currently installed around the world. This addition is significant because the minicomputer market offers extremely attractive growth prospects. In 1978-80, minicomputer sales are expected to grow at an annual compound rate of 35%, more than twice as fast as the mainframe market.

IMMEDIATE OPPORTUNITIES EXIST THROUGHOUT THE UNITED STATES & CANADA

SALES REPRESENTATIVES/SYSTEMS ANALYSTS

MAINFRAMES•SMALL BUSINESS COMPUTERS•MINICOMPUTERS

We're easy to talk to...Call Collect Now
G.C.Goerlitz, Director Executive Search
215-542-5254
or drop a quick line to:
B 301M, Sperry Univac, P.O. Box 500, Blue Bell, PA. 19422

P.S.
See Us At The NCC

SPERRY UNIVAC
An Equal Opportunity Employer M/F

EDP PROJECT LEADERS

GTE International seeks Project Leaders for challenging assignments at home entertainment products factory in Sidi-bel-Abbes, Algeria.
To qualify, you should have at least 3 years experience in design, analysis and programming of systems. Knowledge of Honeywell 6000 hardware and COBOL required. IDS and IMS experience required. Candidate must have start-up experience in manufacturing systems.

Fluency in French required.

Send resume including salary history to: Personnel Dept., GTE International, 32 Third Avenue, Burlington, Massachusetts 01803.

GTE INTERNATIONAL
INCORPORATED

An Equal Opportunity Employer M/F

PROGRAMMERS

Where else in the country can you average 321 days of sunshine? Greyhound Food Management, Phoenix based food service management company, has an immediate need for programmers. You should have experience using COBOL and/or ASSEMBLER on an IBM system 360 operating under OS or VSI.

In addition to outstanding fringe benefits and a competitive salary, we offer a dynamic organization and a community that is conducive to your personal and professional growth

Dream of the wide open spaces and room to breathe? Send resume and salary history to:

Paul G. Dombroski
Greyhound Food
Management, Inc.-3109
Greyhound Tower
Phoenix, Arizona 85077

gfm

An Equal Opportunity Employer M/F

Systems Programmers
Senior & Entry Level Positions

Battelle, one of the world leaders in research and development has immediate openings in the Computer Center Software Support group.

Assignments will include the design of features for the maintenance of operating systems software for both CDC 6000/CYBER NOS/BE and DEC VAX 11/780 VMS systems.

SENIOR LEVEL

Requires a minimum of 3 years' experience with CDC operating systems in a large computer center environment; large scale PDP11 or DEC-20 experience helpful.

ENTRY LEVEL

Requires excellent academic records and references.

You'll each be participating in challenging and interesting projects and must be capable of communicating effectively with a large and diverse user population as well as demonstrated ability in assembly language and FORTRAN programming.

Battelle also has an ongoing need for Project Researchers in a number of computer-oriented disciplines. Challenging and interesting research projects are under way in computer-controlled test equipment, simulation, technical software design, analysis and engineering, microcomputers and interactive graphics.

Positions carry excellent salaries and generous benefits. Send resume in confidence to:

Leslie G. Hill, Manager, Employment

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
An Equal Opportunity Employer

Sr. Prog Anal COBOL, IMS	$20K
Systems Analyst Environ I, COBOL	$20K
Prog. Analyst Assembler	$14.2K
Proj Leader Fortran, Basic, TSO	$22K
Prog. Analyst COBOL, OS	$14-17K
Sr. Prog. Anal Mfg. Applications	$20K
Scien. Prog.	$15-17K

Other Mid-South opportunities available. Call Larry Hewlett (901) 682-1561 or send resume to Empire Personnel, 6263 Poplar, Suite 334, Memphis, Tennessee 38138.

PROGRAMMER ANALYSTS

Openings with American Friends Service Committee, non-profit Quaker service organization.

Senior Programmer Analyst: three years experience COBOL and JCL. Using IBM 370/OS remote-batch system, converting to in-house HP-3000. $14,000-$17,000/year. Excellent fringes.

Another programming position, lower salary.

Contact AFSC Recruitment, 1501 Cherry, Philadelphia, PA 19102.

Affirmative Action Employer

PROJECT LEADER

Applications Design
Mini-Terminals

$24,000 - $27,000

Exeter Associates
Executive Recruiters

Bruce A. Montville
P.O. Box 823
Computer Park
Hampton, N.H. 03842
(603) 926-6712

Coming to NCC? See us there.

Not coming to NCC? See us now.

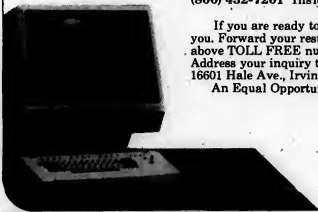
Whether you make it to this years' National Computer Conference may not be really important. What IS important is your career and how you can advance it; at the show, during the show, after the show . . . or now!

If you come to the show come by and see our extensive line of computer graphic terminals systems. See for yourself why we are the undisputed leader in the marketplace: From manufacturing to marketing to service. And while you are there take some time to talk to one of our professionals about joining our team. Because of our dynamic growth we currently have openings throughout the United States for additional sales managers, sales engineers, and systems analysts. There is no better time than now to join Tektronix and perhaps for the first time in your career, get with the leader.

Don't wait for the show. Call our toll free number now, and we'll arrange a personal interview for you now, during the show, or after the show. Our current openings include:

District Sales Managers
OEM Sales Engineers
Sales Engineers
Systems Analysts

Call us now.
(800) 854-0525 Outside California
(800) 432-7201 Inside California



If you are ready to put your talents to work, let's hear from you. Forward your resume or summary sheet or call one of the above TOLL FREE numbers, listing your area of preference. Address your inquiry to Tod Sorensen, TEKTRONIX, INC., 16601 Hale Ave., Irvine, CA 92714.

An Equal Opportunity Employer M/F/H.

Tektronix
COMMITTED TO EXCELLENCE

STATISTICAL COORDINATOR

The Clemson University Computer Center is seeking a Statistical Coordinator to work within its Academic Computing Support Group. This position will be responsible for evaluation, acquisition, installation, development, and maintenance of statistical software used in both batch and TSO environments. Additional responsibilities include coordinating the activities of part-time faculty consultants, supervision of documentation preparation, and development of seminars relating to statistical computing.

Applicants should possess the following qualifications;

1) Ph.D. in statistics or related field, or substantial progress toward such a degree
2) Demonstrated ability in design and implementation of statistical software
3) Working familiarity with major statistical software systems
4) Ability to communicate effectively with faculty and administrators representing a wide variety of disciplines.
5) Knowledge of FORTRAN, PL/I, 370 BAL, OS/VS, JCL, and TSO Internals
6) Teaching and managerial experience.

This job is classified as Systems Programmer II by the State of South Carolina, and has a starting salary of $15,786.

Please send resume to:

C.J. Duckenfield, Dir.
Clemson University
Computer Center
Clemson, S.C. 29631

An Equal Opportunity/ Affirmative Action Employer

SENIOR SYSTEMS ANALYST/ PROGRAMMER

Applicants must demonstrate the ability to confer with managers, scientists, engineers and graduate students in order to define business or scientific/engineering data processing problems, formulating statements of these problems and devising solutions. Requirements include a BS or MS degree in Science or Engineering, with a strong background in Mathematics and Statistics. Applicants should have 5-10 years computing background, including academic experience, with broad computer exposure in the areas of time sharing and batch. Experience in FORTRAN is required, PL/1 and some BAL desired. Salary open, and dependant upon qualifications and experience.

Send complete resume to:

Director of Personnel
The Institute of
Paper Chemistry
P.O. Box 1039
Appleton, Wis. 54912

An equal opportunity employer M/F

ANALYST/ PROGRAMMER

Needed Analyst/Programmer for a large-scale Massachusetts educational computer network to participate in design and implementation of administrative systems for Education - using integrated data base techniques. Requirements: Bachelor's or equivalent experience; 2-3 years experience with administrative application on a large-scale system. CDC CYBER-6000 and/or educational administration experience preferred.

Please send resume to:

Joseph Yuska
MSCCN
150 Causeway St.
Boston, MA 02114

Software Technicians

MVS 168 MP enviroment

Operating Systems

Advanced technical support group seeks OS/VS systems software programmers with at least a year of experience to support and maintain current operating systems.

Teleprocessing

Progressive teleprocessing group seeks experienced TCAM/VTAM programmers to participate in development of SNA/SDLC network. At least one year TCAM/VTAM experience desirable.

We can offer qualified candidates a highly competitive starting salary plus comprehensive fringe benefits and attractive, modern, far northwest Chicago suburban location.

For more information or to schedule an interview please submit resume or call:

Kemper Insurance Companies

T.M. Moreno
(312) 540-2181
Long Grove, Ill. 60049

an equal opportunity/ affirmative action employer

CAREER OPPORTUNITIES AVAILABLE

We are an established package software comapny located in northern Indiana, 90 minutes from Chicago. Our rapid growth has created several attractive career opportunities for the right people. We offer a friendly small-town lifestyle with outstanding recreational facilities available for tennis, golf, fishing, boating and numerous winter sports. We are a progressive, people-oriented organization. The positions offer excellent salaries, good benefits, flexible working hours, and exceptional advancement opportunities. Openings currently exist in:

Programming - We have several openings at varying levels. Requirements range from 0-6 years experience. Knowledge of PDP-11's, RSTS/E, BASIC-PLUS and/or accounting applications desirable. Degree a plus.

For immediate consideration, please send your resume, with salary history, references and requirements to Mr. Al Chasser, PLYCOM Services, Inc., P.O. Box 160, Plymouth, IN 46563.

Plycom services, Inc

SYSTEMS & PROGRAMMING MANAGER

We are a rapidly expanding retail chain whose corporate headquarters are located in metropolitan New Jersey. We have just completed installing a "Total Merchandising System" and are now ready to embark upon an on-line warehousing system, plus an expansion of our present P.O.S. system to capture all financial and merchandising data at store level.

We seek an individual with proven management and technical abilities to assume full responsibility for all new systems, utilizing our N.C.R. Criterion System and the talent of our existing programming staff.

The successful candidate must have a minimum of 5 years' experience with COBOL programming techniques and the use of ISAM files in a multi-programming environment. 2 years' supervisory programming experience is also required. Experience in a retail or warehouse environment is helpful but not essential.

Comprehensive company-paid life and health insurance benefits, profit-sharing and annual bonus offered. Salary negotiable. All replies held in strict confidence. Please send resume and salary history to:

Box 214, NPM
655 Madison Avenue
New York, N.Y. 10021

JOIN THE 32-BIT SUPER MINI LEADER!

SYSTEMS ENGINEERING LABORATORIES IN FLORIDA

SYSTEMS, a strongly established leader in the real-time computer field, has several immediate openings at its headquarters in a highly desirable suburb of Ft. Lauderdale, Florida. We invite you to be part of a dynamic growth company that offers excellent starting salaries and a full range benefits program, including dental insurance.

SENIOR LOGIC DESIGNERS

Positions involve custom systems design work. Some microprogramming experience desirable, along with capability to direct activities of junior engineers.

DIAGNOSTICS PROGRAMMERS

Experienced in discovering and isolating hardware faults.

MICROPROGRAMMERS

Experienced in firmware design with a desire to grow within a dynamic department.

PROGRAMMERS/ASSEMBLY LANGUAGE

Opportunity to join small group and work on real-time systems development. Should have experience in developing programs in both ASSEMBLY and FORTRAN languages, and have or seek overall systems understanding in a state-of-the-art computer manufacturer environment.

DIGITAL COMPUTER TECHNICIANS

Minimum of 1 year experience working on state-of-the-art computer hardware. You'll work closely with design engineers on advanced hardware computer design.

PROJECT ENGINEER

Individual we seek must be familiar with both software and hardware computer fields. The successful candidate must be able to interact among hardware design engineers, software programmers and most important, our customers in day to day working environment. As project engineer, you will be responsible for customer interface from initial proposals through completion of the computer sales. Prefer 2 to 5 years experience.

SALES SUPPORT SPECIALIST

Position will provide field sales and analysis support in the operating systems area. Prefer 2 plus years experience.

FOR IMMEDIATE AND CONFIDENTIAL CONSIDERATION, please send your resume or letter of information with current salary to Mr. Frederick J. Britlante.

SYSTEMS
ENGINEERING LABORATORIES

6901 West Sunrise Blvd., Fort Lauderdale, Florida 33313
Equal Opportunity Employer Male Female

PROJECT MANAGER

Information Systems Development

Dunkin' Donuts is the leader in its segment of the rapidly growing fast food industry. Currently, there are Dunkin' Donuts shops throughout the United States, Canada, Puerto Rico and Japan. Chainwide sales for fiscal 1977 were in excess of $221-million and profits set a record for the second year in a row.

The company has an opportunity available in its Information Services Department for a qualified Project Manager. The selected individual will work with corporate management to analyze business problems and manage the implementation of effective computer-based solutions. Ability to communicate and interact successfully with all levels of management is vital to this position. Prior successful application system development experience is a must. A degree is required, (MBA preferred).

This position offers an excellent salary and comprehensive benefits program.

Interested and qualified candidates should send resume, including salary history, in confidence to: S.E. Woogmaster.

DUNKIN' DONUTS
Incorporated
Randolph Industrial Park
Randolph, MA 02368
An Equal Opportunity Employer M/F

ASSOCIATE DIRECTOR

University Computing Ctr.

Manager Academic User Services incl. statistical and general consulting sections. Master's deg. req'd. Must effectively communicate with faculty, staff and student users. High level computer languages and three years mgm't. exp. on large general purpose computer systems in university environments req'd. Statistical educ. and exp. highly desireable. Xerox Sigma/CP-V computer exp. desireable. Send resumes to Dr. David Veught, Dir. Computer Services, Memphis State Univ., Memphis, TN 38152 by May 29, 1978, incl. tel. number and available times for possible telephone contact. EQUAL OPPORTUNITY EMPLOYER, M/F

DIRECTOR TECHNICAL SUPPORT

New England corp. creating executive level position for promotable DP pro to direct all tech. aspects of a lge. IBM Data Center. Indiv. must have extensive hardware/software planning, evaluation of IBM products and services. Salary to $40,000 (Fee Paid). Contact Stan Durbas, Robert Half Personnel,

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl St.
Hartford, Conn. 06103
(203) 278-7170

PROGRAMMER/ANALYSTS

Apply your software background to the unique and fast-paced environment of Ink-Jet.

Mead Digital Systems, a recognized leader in the development and commercialization of ink-jet imaging offers the exceptional individual the opportunity:

- To develop and lead software products through conceptualization to the marketplace.
- For unusually attractive professional growth.
- To work with a result-oriented marketing and software team.
- To extend state-of-the-art software applications for ink-jet technology.

To meet the challenge of these opportunities, your applications experience must include any three of the following:

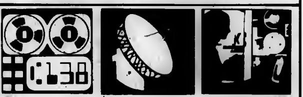
- A minimum of one to two years ASSEMBLER with IBM 360/370 on OS or DOS.
- A minimum of two years writing ASSEMBLER and FORTRAN programs.
- Mini-computer experience, preferably with Interdata, desirable.
- Developing software and font designs for digital type composing machines.
- Developing word processing software for computer letter and similar applications.

Although we're part of the $1.8 Billion Mead Corporation, our small group offers the opportunity to start at ground level with full support - and move up rapidly into advanced technical or management positions. Highly competitive salary and comprehensive benefits.

Your contributions and abilities will be evaluated carefully and fully recognized. Please forward detailed resume in confidence to: Manager, Professional Employment. No agencies, please.

Mead DigitalSystems

World Headquarters • Courthouse Plaza N.E., Dayton, Ohio 45463
Equal Opportunity Employer M/F/H



Computer Scientists & Software Engineers

Would you like to be a contributor at one of the San Francisco Bay Area's fastest growing software systems developers? Are you one of those especially talented individuals who relishes the challenge of solving complex problems, who wants to stay on the forefront of technology, who uses structured design and implementation methods, and who would like to work in an environment where you experience in one or more of the following areas would be recognized and put to immediate use?

- UNIX-based software engineering
- Distributed systems technology
  - Distributed data base management systems
  - Real-time data collection/synthesis
  - Local network architectures
  - Network protocols (ARPAnet, EtherNet)
- Reliable systems technology
  - Formal specification and program verification
  - Secure systems technology
- Microprocessor systems architecture
- Image & signal processing
- Interactive computer graphics
- Advanced scientific programming
- Systems programming: UNIX, RSX-110/M, IAS, VMS
- Communications systems
  - Packet/message switching
  - Environmental applications
  - Circuit switching

If you have a BS, MS, PhD or equivalent experience in one or more of the areas listed above, please send us a copy of your resume in confidence - or call toll free (800) 227-8433. If you qualify for one of our select positions, you will receive the professional recognition you deserve, excellent compensation, and one of the best fringe benefit packages in the country. Refer to Professional Employment, Dept. PF-52.

Ford Aerospace & Communications Corporation

Western Development Laboratories Division
3939 Fabian Way, Palo Alto, California 94303

An Equal Opportunity Employer M/F

SYSTEMS ANALYST

Opening in Rockville, Maryland

Excellent opportunity for experienced Analyst/Programmer to join our REGIONAL SUPPORT GROUP. You will provide technical advice and consultation to our NCR District offices and customers. Your responsibilities will range from fault resolution to systems design and configuration. Our comprehensive training program will complement your current capabilities.

We offer competitive salary and comprehensive employee benefits. If you have a degree and are looking for a rewarding career move, contact us today for confidential consideration.

CALL COLLECT

Mr. S. Babish
(301) 948-9269 or 948-4700
Or send resume to NCR Corporation, 2301 Research Blvd., Rockville, MD 20850, Attn: Field Support.

NCR
Complete Computer Systems
An Equal Opportunity Employer

Software Specialist

Systems You Can Build Your Career On!

The Technical Services Division of Sperry Univac designs and develops advanced software systems. We enjoy an enviable record of accomplishment and a reputation for producing high quality software. Our success is due to our highly talented and innovative professional staff. We are seeking top-notch software specialists who feel they can contribute in any of the following areas:

Real Time Tactical Applications

- Shipboard Command & Control
- Weapons Systems Fire Control
- Tactical Data Systems
- ASW Applications
- Intelligence Systems
- Communications

Dahlgren, Va.

Projects are in support of the Naval Surface Weapons Lab, and involve design, development and integration of advanced real-time software systems. Dahlgren is located approximately 60 miles from Washington, D.C. and 26 miles from Fredickersburg in the beautiful countryside of Virginia.

Lexington Park, Md.

We are providing total systems support for Navy Command and Control Systems and Tactical Data Systems, from concept definitions through life cycle maintenance, Lexington Park is located in a relaxed waterfront setting, 60 miles S.E. of D.C.

FOR IMMEDIATE CONSIDERATION
CALL COLLECT: JOHN DePRIMA
(703) 558-4486
Or Rush Resume to:

SPERRY UNIVAC

Technical Services Division
1901 N. Moore Street
Arlington, Virginia 22209
An Equal Opportunity Employer M/F/H

MAJOR EXPANSION...
INFORMATION SYSTEMS

Outstanding career opportunities in manufacturing, distribution and financial systems.

PROJECT LEADERS & MANAGERS
SENIOR SYSTEMS ANALYSTS
SENIOR PROGRAMMER ANALYSTS
SYSTEMS SOFTWARE PROGRAMMERS

We are the systems planning and development department of one of the world's leading consumer products corporations based in New York City. Our expansion affords exceptional opportunities for experienced skilled systems and programming professionals anxious for the challenge and reward associated in the implementation of enhanced systems to support the management of the business.

If you have worked on manufacturing, distribution or financial systems in a major corporation and have had experience in implementing any of the following applications: General ledger, materials requirement planning, accounts receivable, production scheduling, raw material inventory control, and forecasting . . . we can offer you:

- *The challenge and responsibility of creative original systems and program design & implementation*
- *A corporate commitment to advanced data systems*
- *Professional and highly motivated work associates*
- *Above average compensation package*
- *State-of-the-art hardware*
- *Career growth in a progressive company where individual contribution is recognized and rewarded*

If you are interested, let us hear from you. Send resume or letter describing your background, accomplishments and salary history to:
MR. S. L. SMITH

Standard Brands
INCORPORATED
625 Madison Ave., New York, N.Y. 10022
An Equal Opportunity Employer (M/F)

SYSTEMS & PROGRAMMING MANAGER

Idaho based Statewide Educational Planning and Reporting System (SEPARS) needs Systems & Programming Manager. Plans, organizes, directs and controls systems and programming activity. Over 50 public school districts utilizing the service. SEPARS also provides service the the State Department of Education, Vocational Education, and the State Board of Education. Applicant should have bachelors degree. Prefer over five years data processing experience with at least two in management.

Boise, Idaho is the capital of Idaho. It has an excellent climate and a variety of cultural and recreational opportunities.

Salary: $19,000 - $22,000. A letter of application and a complete resume should be sent by June 16, 1978 to:

Jack B. Hoffman, Director
SEPARS
Len B. Jordan Bldg., Room 343
650 West State Street
Boise, ID 83720

PROGRAMMERS

Children's Hospital Medical Center has immediate openings for Applications programmers. Successful candidates must have a minimum of 2 years' experience in business applications with COBOL and IBM DOS/VS. CICS experience a plus.

Salary commensurate with experience. Excellent benefits package including **3 WEEKS VACATION** the first year.

Interested applicants please send resume to Pamela Williams, Personnel Department, 300 Longwood Ave., Boston, MA 02115.

Children's Hospital MEDICAL CENTER
An Affirmative Action · Equal Opportunity Employer

Data Processing Careers
Denver, Colorado

PROGRAMMERS

Martin Marietta Data Systems offers superior opportunities in a business application environment for Senior Level Programmers with two or more years experience on IBM 370 systems. Your expertise will be challenged in application areas which will include Finance, Manufacturing, and Engineering Systems. Qualified candidates should have experience with OS or MVS, COBOL, and TSO. IMS batch and on-line experience is desirable.

CONSULTANTS

We also have outstanding career openings for qualified consultants with 8-10 years experience in consulting, proposal writing, applications, and/or technical presentations. You must have a thorough knowledge of IMS facilities.

Martin Marietta provides excellent fringe benefits, and interview and relocation expenses will be paid.

For complete information on making your career move to the Rocky Mountain region, please send your resume, including salary history, in confidence to Mervin Crandall, Manager, Human Resources.

MARTIN MARIETTA

MARTIN MARIETTA DATA SYSTEMS
Denver Data Center
P.O. Box 179
Denver, Colorado 80201
An Equal Opportunity Employer M/F

Software Professionals!

Distributed Computing is the Future

But at Digital, that comes as no surprise, because we've been promoting and developing distributed computing for a long time. Digital has been an innovator in the design and manufacture of distributed processing systems. We're currently recording significant new advancements in this field, and need talented professionals to augment our efforts in the following areas:

DISTRIBUTED SYSTEMS ARCHITECTURE

Defining and specifying interfaces and protocols in Digital network architecture, you will have the opportunity to define state-of-the-art concepts and work with Advanced Systems Development to translate these into competitive products. You will also represent Digital in standards activities affecting distributed systems.

We require senior analysts with 3 to 5 years experience defining and implementing network software in the following areas: network architecture • network terminals • distributed algorithms • data base architecture.

ADVANCED SYSTEMS DEVELOPMENT

We need talented professionals to provide the early definition and design of future microprocessors, distributed data bases and network products. Individuals will have the opportunity to scope and design from the conception state to finished product.

We require senior analysts with 3 to 5 years of system or network experience in the following areas: microprogram design • network product design • network architecture • data base architecture • systems modeling • performance measurement and analysis.

NETWORK SYSTEMS DEVELOPMENT

You will be charged with the responsibility of designing and providing software and firmware modules for future network products. Concentrating both of these developments in one group of professionals allows the application of interdisciplinary system design techniques.

Opportunities exist for software professionals with 2 to 4 years experience in any of the following areas: design and development of communications protocol drivers • SNA • DNA • X.25 or any other protocols.

NETWORK SOFTWARE

We seek individuals who have system software background on RSK-11M/S, RSX/1AS, and RT-11. Qualified applicants will provide definition, design, and implementation in one of the following areas: microprocessor software • communications • links disciplines • network software.

For further information please call Dick MacDonough at (617) 493-9047, or write him at Digital Equipment Corporation, Dept. B522 3807, 146 Main St., Maynard, Mass. 01754. We are an equal opportunity employer m/f.

digital

PDP REQUIREMENTS

Amtrak has immediate requirement within its Systems Support Staff for Communications oriented Programmers and Programmer Analysts. The specific project involves the re-design and upgrade of our reservations' system front-end. This system will be implemented on a DEC PDP 11/55 under RSX11-M and support a nationwide network of 3000 terminals. It will also interface a CDC-3500 (ARTS) System and an IBM 370/158 (ACP) System. All communications will be supported VIA DV11 multiplexers.

All positions require a thorough knowledge of PDP 11's and MACRO-11. IBM ALC experience will be a definite plus.

We offer excellent salary, benefits and growth opportunity in a challenging environment. Send resume, INCLUDING SALARY HISTORY, in confidence to: Elaine Ridley, Personnel, Amtrak, 400 N. Capitol St., NW, Washington, D.C. 20001.

An Equal Opportunity Employer M/F

Amtrak

---

career path

If you are NOW searching or intend to pursue a position in the near FUTURE, call us! We will direct you in the best interests of your career whether it be a technical position or management. Our areas of specialty are:

- Commercial applications
- Operating systems
- Mini computers
- Scientific

call or send resume to:
(213) 670-7353

the jarvis walker group

jarvis walker group agency
11222 S. La Cienaga Blvd.
Suite 400
Inglewood, CA 90304
No Expense To Applicant

COBOL

This Systems division of Litton offers an outstanding growth opportunity to a COBOL programmer who wants to broaden his career. While 370/On-Line DL/1 experience is a PLUS, Systems 2000 or hands-on experience with 370/158 will help you design and implement our information systems.

Besides offering excellent salary and benefits, here's your opportunity to impact both the manufacture and distribution of our advanced electronic equipment, as well as administration.

Sound like the opportunity you seek? Talk to us! If you don't have a resume, telephone. If you have a resume, please send it in confidence including salary history to:

TOM CAWRSE

(301) 864-5600

Amecom Division

Litton

LITTON SYSTEMS, INC.

5115 Calvert Road
College Park, MD 20740

An Equal Opportunity Employer M/F/H.

PONDEROSA SYSTEM INC

DATA PROCESSING OPPORTUNITIES WITH PONDEROSA!!!

MIS PROJECT LEADER

We are seeking a Project Leader to be responsible for installing a $120,000+ third party Human Resource/Payroll System on our IBM 370-3031 OS/MVS hardware. After successful completion of this effort, the incumbent will become an integral part of the project development/supervision team of our MIS Department.

Position requires a B.S. degree, six to eight years DP experience, two years of project supervision with three to five years comprehensive expertise in payroll/personnel system applications. Large scale mainframe, data base and online experience is also required.

We offer an excellent salary $24,000 to $33,000 (depending on experience), bonus and a comprehensive benefits package.

SENIOR PROGRAMMER/ANALYST

We are seeking a Senior Programmer/Analyst to become involved in our online CRT user interactive programming applications. We will be upgrading our system this fall to IBM 370-3031 under OS/MVS/IMS/TSO.

The position requires a B.S. degree, 5-7 years programming with a minimum of 3 years experience in large scale IBM 370, COBOL, IMS/OB-OC.

We offer a salary range in the low to mid 20's, plus a bonus plan. The benefit package is comprehensive. We pay all relocation expenses.

Send resume or call collect:

Susan J. Way
PONOEROSA, SYSTEM, INC.
P.O. Box 578
Dayton, OH 45401
(513) 890-6400

We Are An
Equal Opportunity
Employer M/F

Detach here, moisten and seal envelope securely before mailing

Fold and insert order form (attached through binding) and remittance here.

USE THE ATTACHED
ORDER FORM AND
THIS ENVELOPE FOR

a new subscription
new address
new title
new industry

first class
permit no 40760
newton ma

BUSINESS [illegible] *no postage stamp necessary if mailed in the United States*

[illegible]

797 Washington Street
Newton MA 02160

Information Systems Professionals

Milwaukee based Fortune 400 manufacturer needs experienced expertise in the following areas:

LONG RANGE SYSTEMS PLANNER

Your 8 to 10 years in EDP should have given you a wide range of exposure to different business applications, or even consulting work. Responsibilities include assisting business groups and the corporate service organization to develop their individual information systems plans, by defining systems and data bases required to produce information for management planning and decision making. Involvement also will include implementation resource estimates and consolidation of group plans into a 3-5 year system development plan for the corporation.

CORPORATE DATA PLANNER

Your 6 to 8 years in EDP should have given you a thorough knowledge of data base systems. Responsibilities include developing and publishing data base strategy and policies for the entire corporation, in terms of geographical data location, data grouping, data relationships, data element definition, and the use of data base management systems technology. The incumbent will also provide consultation to all data base centers.

INFORMATION SYSTEMS TECHNOLOGY PLANNER

Your 6 to 8 years in an EDP technical support environment should have given you exposure to various business applications of computer and communication systems. Responsibilities include the research and forecasting of technology availability resulting in corporate-wide policy making regarding the selection and use of information system hardware, system software, and communication components. Knowledge of large mainframe and minicomputer is required

DP TECHNICAL SUPPORT SPECIALIST

Your 5 plus years as a systems analyst and programmer should have given you a broad based knowledge of System 3, RPG II, CCP, and TOTAL, and the ability to communicate this knowledge to others. Responsibilities of this position will include research directed toward establishing corporate-wide standards and policies, training, and planning, programming testing, and implementing computer programs of general utility to the company.

If you desire a challenge and an exciting future, submit your resume in strict confidence with salary history to:

Lee A. Junkens
CUTLER-HAMMER, INC.
4201 No. 27th St.
Milwaukee, WI 53216
An Equal Opportunity Employer

Sycor, Inc. Has Several Outstanding Opportunities Available for Compiler Development Managers and Senior Programmers

MANAGERS — These positions require experience in the supervision of the software professionals, at all levels, engaged in the design development and maintenance of compilers and related systems for high level languages, such as COBOL, BASIC and PLM. Candidates must have experience in the application of state-of-the-art techniques in compiler technology and software engineering These are high visibility positions with excellent opportunity for advancement

SENIOR PROGRAMMERS — Successful candidates will participate in the design implementation of higher level language compilers for micro processor based intelligent systems. Candidates must have proven experience in the implementation of production compilers for higher level languages using state-of-the-art compiler development technology

Educational Requirements MS in Computer or related field, or equivalent experience

Please send your resume or call collect to

C. J. Corona • Director, Industrial Relations • SYCOR, INC. • 100 Phoenix Drive • Ann Arbor, MI 48104 • (313) 995-1380

An Equal Opportunity Employer M F
"Sycor Puts Computer Power Where the Work is"

SYCOR

SYCOR INC

Senior Staff Engineer

Hughes Computing and Data Processing has an immediate requirement for a MS or PhD in Computer Science, plus in-depth experience supporting users of scientific and engineering data processing.

You will be headquartered at Hughes Los Angeles, but will travel to the various LA area Hughes sites, as needed, to:

- Understand the engineering computing requirements of the organizations.
- Work with various organizations in a systems analyst capacity to help develop new systems or modify existing systems to satisfy these requirements.
- Be involved in hardware or software evaluation tasks either as the prime investigator or as a member of a user/C&DP team.
- Be involved in user education, either giving courses or organizing them to meet user needs.

Please mail your resume to: Professional Employment, Computing and Data Processing, Dept. 63-50, P.O. Box 3310, Fullerton, CA 92634.

HUGHES
HUGHES AIRCRAFT COMPANY

U.S. citizenship required • Equal Opportunity M/F/HC Employer

---

PROGRAMMERS

SYSTEMS ANALYST PROJECT LEADERS

ALL FEES & RELOCATIONS PAID BY CLIENT FIRMS

FRAN ROGERS ASSOC are specialists in EDP recruiting. Whether you like San Francisco or Topeka, Kansas-- we have clients who need your skills. Below are a partial listing of some of our requirements:

Dir Syst & Prog NYC. Burroughs & IBM experience	$30K
Sr. Sys Analyst Banking or mfg environment	$23-27K
EDP Auditors 2-3 yrs exp. NY, Calif or Ohio	$18-23K
Prog An/App Prog Multiple openings in all areas	$15-22K

Submit resume or contact
FRAN ROGERS ASSOC.
25 South Service Rd.
Jericho, N.Y. 11753
516-997-4373 212-347-6313

DATA BASE ADMINISTRATOR

Riverside County, California's fastest growing, requires a strong, user oriented DBA to manage a series of complex interrelated IBM IMS Data Bases and Data Communications, and to lead the County's SHARE Team. Applicants must possess at least 2 years of college, or 4 years of experience one year of which has been as a DBA in an IMS -DB DC environment doing such things as data base design, data communications and data bases implementation, supervising or performing data base backup and recovery, reorganizations and performance monitoring. IBM or other vendor training will be accepted in lieu of certain requirements.

Exceptionally qualified candidate may be appointed at an advanced step, up to $25,724 per year. Excellent benefits in beautiful Southern California. Telephone immediately for application.

RIVERSIDE COUNTY
Personnel Department
County Administrative Center
4080 Lemon St., Rm. 109
Riverside, CA 92501
(714) 787-6125
An EOE/AA

Senior Systems Analyst

Gilbarco, a dynamic manufacturing company and a growing subsidiary of Exxon Enterprises Inc. has an immediate opportunity available for a Systems Analyst. You will be responsible for Systems Analysis, and Design through implementation including conducting feasibility studies, programming and testing, debugging, documentation and procedure writing.

You should have a BA, BBA or BS in Computer Sciences with in-depth experience in Systems Design and Programming (preferably in a manufacturing environment) and a working knowledge of MRP, Inventory and Shop Floor Control. Competency in ANS COBOL programming on Disk oriented IBM 360/370 computer a MUST. Experience with DBOMP Software and CRT Systems desirable.

We offer excellent growth potential. Salary commensurate with experience and qualications plus liberal fringe benefits. Greensboro is ideally situated in the Piedmont area of North Carolina and affords excellent educational and recreational facilities. For consideration, please send a complete resume, in confidence to: Ms. Sharon Everhart, Employee Relations Department, Gilbarco, P.O. Box 22087, Greensboro, N.C. 27420.

Gilbarco
A wholly owned subsidiary of EXXON Enterprises Inc.

We are an equal opportunity employer and invite response from minority and female applicants

Alcoa Management Information Services has 3 immediate openings for:

Senior Systems Analysts

These positions generated via growth within our organization require experience on large 370/158 or 168 IBM computers. COBOL, IMS or TOTAL and transaction processing systems exposure is desired. You'll each assume responsibility for the design, development and implementation of information systems in areas such as on-line sales office administration systems and financial and personnel data bases.

We offer excellent salaries, liberal benefits which include relocation assistance, and growth potential. If interested and qualified, please send resume including salary history and requirements in confidence to or call: (412) 553-2219, Manager of Professional Employment, 2530 Alcoa Building, Pittsburgh, Pennsylvania 15219. Alcoa is an equal opportunity employer m/f/h. (No Agencies Please)

**We Can't Wait
For Tomorrow**

ALCOA

RSX 11M Internals Expert

TO $30,000

Excellent opportunity with a rapidly expanding Westchester, N.Y. systems house for an outstanding programmer with hands-on experience with RSX 11M. Opportunity to analyze systems level problems and add enhancements to RSX 11M. Knowledge of communications & data base design desirable.

Excellent fringe benefits & growth potential.

Send Resume To:

Composition Systems Inc.

570 Taxter Road Elmsford, N.Y. 10523

SYSTEMS PROGRAMMERS:

Dead-ended in a large DP installation? We can help you run toward daylight!

We're looking for Systems Programmers whose talent, experience and dedication are not utilized in their present jobs.

As the makers of SyncSort — the fastest-growing, high-technology sorting programs available — we offer outstanding opportunities for professional growth, financial advancement, personal satisfaction.

If you join us, you'll learn to provide creative customer service to many of the best-known companies on the Fortune 500 List. You'll investigate and solve operating-system problems, trouble shoot and debug — in a growing department, of a growing company, of a growing industry.

We seek people with:

- **At least one year's BAL programming experience;**
- **Knowledge of OS and OS/VS internals;**
- **A bachelor's degree.**

We offer excellent starting salaries and benefits, and a congenial, highly professional working environment in a pleasant suburban setting.

If you feel you qualify, and have a desire to break into the clear at last, send a confidential resume to:

An equal opportunity employer m/f

**WHITLOW
COMPUTER SYSTEMS Inc.**

560 Sylvan Ave., Englewood Cliffs, N.J. 07632

SR. PROGRAMMER/ANALYST

BA degree or Certificate in Data Processing and 4 to 6 years programming experience is required. A strong background in ANS COBOL or PL/I is required. This person would assume project responsibility for maintaining and developing all Institutional Research applications and function as direct liaison between the Office of Institutional Research and Office of Computer Services in preparing logical interfaces between existing and newly developed software. Applicant must be able to function independently with infrequent supervision. For information call Dr. David C. Beardslee, 313-377-2387. Send resume to Oakland University, Employment Office, 141 North Foundation Hall, Rochester, MI 48063 Phone 313-377-3480. AN AFFIRMATIVE ACTION EMPLOYER.

EDP OPPORTUNITIES

MAS ·Cnslnt·mini/medium size hardware Exper, degree — $35K

CREDIT Card Systems-development & mgmt — $29-36K

MINI Computer anal·micro data — $24K

SYSTEMS Software-modify operating systems OS or DOS ALP — $23-30K

PDP 11/45 RSTS BASIC+ Fort co. 50% travel U.S. — $23-25K

SOFTWARE support RSX 11M RSTS — $Open

SOFTWARE CICS OL 1-new shop — $Open

CICS DOS or OS-new development ppty w/maj fincl institution currently formulating complete new system development dept — $Open

FORMS Design-1 yr exp, degree — $12-14,500

SALES

TIME sharing sales IBM/CDC-base sal + Com.

SALES -mini computer base Sal & comm.

SYSTEMS Engr-mktg-formal training. COBOL BAL RPG — Sal+ comm

SYSTEMS Engr-pre sales support mini software — Sal & Comm

SALES/ Software DEC HP IBM — $35K

Bill Borrelli (212) 349-3610

William Harris Assoc.

150 B'way NY 10038
agency

THE
WAYNE HAMMOND
AGENCY

Executive Placement Service
and Contingency Search

**Specialists in
Data Processing**

The Nation's Most Respected
Executive Personnel Service
Ask Our Clients Why

533 Airport Boulevard, Suite 500
Burlingame, California 94010
At S.F. Intl Airport (415) 348 1535

POSITION OPENING

Director Data Processing

Pennsbury School District (12,000 Enrollment) Full Management Responsibilities. Salary Range $22,560 - $28,660. Will recognize experience for starting salary.

Send resumes to:
David H. Rhone
Assistant Superintendent
Business Affairs
Pennsbury School District
Yardley Avenue
Fallsington, PA 19067

CYBERSEARCH

The *COMPUTERIZED* Employment Service

AMBITIOUS D.P. PROS

Before you sign up with *just anyone to help you find a job*, ask them if they're computerized. CYBERSEARCH® IS!

So you derive all the inherent benefits of SPEED, ACCURACY, CHOICE and less chance of being by-passed!

Your qualifications are instantly available to our experienced consultants who have career openings they must fill — nationally in all types of companies.

No cost to you — all fees are employer-paid. To protect your identity your name and present employer's name are not included in our computer data base.

Simply call or write the CYBERSEARCH Office nearest you. CYBERSEARCH WORKS!

Why shouldn't computers help you advance your career... after all, you're *in* the computer industry.

	TO
TS SALES SUPPORT	$20K
CUST. SVCE/DP EXP.	$16K
APP. ANALYSTS/TERM. & PER.	$25K
COBOL PROG. ANALYSTS	$25K
SENIOR PGMRS.	$20K
SALES SUPP. ANAL/MINI PROG. ANALYST RXX-11	$22K
FTN PROG/RT HP21MX$22K	
SR. COBOL PROG. HVY ALC	$22K
3-5 YRS EXP ON 360/65, 370/168, OS-MRT	$23K
SY. ANAL. DES. BIOMED SWARE MINIS-SCI OG PTO	$25K
AND MANY MORE	

For more information, please contact our local office. Ask for the data processing department.

CONTROL DATA CYBERSEARCH INC.

a subsidiary of
CONTROL DATA CORPORATION

CHICAGO, IL
214 North Michigan
60601
312-454-8490

IRVINE, CA
17744 Sky Park Boulevard
92714
714-754-7701

PHILADELPHIA, PA
Two Balacynwyd Plaza
19004
215-667-2400

DALLAS, TX
8585 Stemmons Freeway
75247
214-688-5810

LOS ANGELES, CA
8616 La Tijera Boulevard
90045
213-642-2462

SAN JOSE, CA
2025 Gateway Place
95110
408-866-3186

HOUSTON, TX
2000 West Loop South
77027
713-965-5666

MINNEAPOLIS, MN
6800 France Ave. South
55435
612-830-6650

---

data processing

Alaska

Systems Programmers
Systems Analysts
Application Programmers

Join the State of Alaska's upgrade to a large state-of-the-art network that covers 4 time zones. Two or more years' experience with large systems (OS, CICS, MVS/TSO, DL/1 or equivalent) is preferred.

Recreational opportunities galore: fishing, hunting, boating, scuba diving, skiing, hiking and others are just minutes away. The climate is moderate in an area surrounded by snow capped, spruce and hemlock covered mountains, salt water bays and inlets protected from the ocean by innumerable forest covered islands.

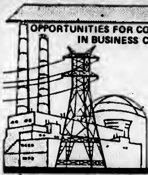
Salary $1,934 to $2,598 per month DOE. Interviews in major cities depending upon response. Send resume via U.S. Postal Service Priority Mail, Special Delivery to:

**State of Alaska,
Recruitment Coordinator,
Division of Personnel
and Labor Relations,
Pouch C,
Juneau, Alaska 99811.**

The State of Alaska

is an equal opportunity employer m/f/hc

OPPORTUNITIES FOR COMPUTER PROFESSIONALS IN BUSINESS COMPUTER APPLICATIONS:



ANALYST PROGRAMMERS

We have openings for experienced individuals who have a proven track record in large applications systems using advanced IBM 370 hardware and software technology. If you desire to help us ready for the 1980's, if you produce quality systems on time, within budget, within specifications, you may like the challenges.

TP EXPERIENCE

Our TP project has openings for experienced persons who seek to further their learning in the 370 MVS TP environment. The persons who have more than one year of solid track record in one or more of the following should apply: CICS-VS; 370X NCP or emulator, VTAM/SNA, TCAM, BTAM. A technical leadership position is also available for an individual with two years of heavy experience in TP software and the ability to combine the components of a multi application on-line environment into a cohesive action plan.

Please apply in writing with educational, employment and salary history to:

Mrs. Linda Heidenis
NORTHEAST UTILITIES
P.O. Box 270, Hartford, Conn. 06101

The Connecticut Light and Power Co.
The Hartford Electric Light Co.
Western Massachusetts Electric Co.
Holyoke Water Power Co.
Northeast Utilities Service Co.
Northeast Nuclear Energy Co.

an affirmative action, equal opportunity employer m/f

AGS

PROGRAMMER/ ANALYSTS

AGS is a professional systems development firm providing: Consulting, Systems Design, Programming, Communications, Engineering and Systems Training Services to a diversified group of major corporations. Our staff now numbers over 200 people and we are planning for significant expansion in 1978.

We are currently developing systems on the Series/1 and looking for additional Programmer/Analysts to join our Mini-Computer Systems Group.

Additionally, we are looking for qualified Designers and Programmers to be trained on the Series/1. If you are experienced with BAL, PL/1, FORTRAN, OS/DOS . . . why not look into an outstanding career opportunity with AGS.

Please send resume in confidence, including salary requirements or call: Liz Maynor, Personnel Director (212) 732-5700

AGS COMPUTERS, INC.
111 Broadway, New York, N.Y. 10006
An equal opportunity employer M/F

ADAPSO

FIELD ENGINEERS
IBM 360/370, SYSTEM/3 MINI SYSTEMS

SORBUS INC., a leader in EDP equipment maintenance, has immediate openings nationwide for highly skilled Field Engineering professionals.

Our expanding service network offers an opportunity to specialize or diversify. Background should include at least 3-5 years experience in maintenance and repair of IBM 360/370, System/3, or comparable large scale or mini systems and peripherals.

These positions provide excellent opportunities for personal recognition and professional growth through advanced training and career development programs, along with attractive compensation, incentives, and benefits.

If you are interested in working for a progressive company, and want a bright future, please write or call toll free:

Les Broadway
Personnel Administrator
SORBUS INC.
150 Allendale Road
King of Prussia, PA 19406
(800)-523-5632

SORBUS INC.
anMAIcompany

An Affirmative Action Employer

Systems Professionals
Management Consulting As A Career Option

Booz • Allen & Hamilton is one of the largest and most prominent world-wide management, technical and marketing research consulting firms. The continuing development of our Information Systems Practice has created opportunities for several highly skilled, highly motivated systems professionals with our New York consulting staff.

The individuals we seek will place a high value on the opportunity for:

- Senior management client interface
- Diversified functional and industrial project exposure
- Multi-disciplinary approach to problem solving
- Accelerated professional development

New members of the staff will be assigned to senior management oriented projects dealing with the development of advanced applications systems. The individuals we seek should possess strong written and verbal communications skills, a college degree (advanced business or technical degree preferred but not essential), and a minimum of 3 years experience in one or more of the following areas:

Property and Casualty Systems

- Advanced Commercial (and Personal) Lines Applications Systems—using distributed/on-line systems for rating/underwriting, claims handling, statistical data collections, loss policy issue, and information systems.
- Advanced Hardware/Software Systems—planning for intelligent terminals, network design, data base systems.
- Broad Exposure to Property/Casualty Business Issues—including impact on systems of new products; distribution, operations and management control.

Banking Systems

Experience in several of the following areas:

- Hands-on major commercial bank computer applications including DDA, Savings, commercial accounts and trust.
- EFTS feasibility studies, systems design and implementation assistance
- Distributed Systems for branch operations and decentralized holding company subsidiaries.
- User Department contact and appreciation of central computer operation

Systems Technology (Minis and Large Scale)

- Technical resource planning in an aggressive large-scale IBM/mini environment.
- Experience communicating complex technical issues to non-technical management.
- Implementation of major on-line/data base systems.
- Background in shirt-sleeve technical services management utilizing a broad range of measurement and control techniques.

These positions provide an opportunity for a high degree of challenge, reward and professional development for achievement oriented individuals. The positions involve travel and offer attractive compensation packages. Please respond in total confidence with a resume or letter to **Michael Stewart.**

BOOZ ALLEN

**BOOZ • ALLEN &
HAMILTON Inc.
245 Park Avenue
New York, N.Y. 10017**

We are an equal opportunity employer, m f

THE RESUME SYNDROME

19 of 20 resumes end up in somebody's wastebasket. If you want your resume to be the 1 in 20 that gets results, ask for our free booklet "How to Write A Resume". In fact, send your resume and we'll critique it. All replies held in strictest confidence. 100% company retained placement consultants.

The National Personnel System
Dunhill
*OF DEARBORN, INC.
Parklane Towers West, Suite 519
Dearborn, MICH 48126
(313) 336-7990.*

SYSTEMS ANALYST

State Judicial Information System Project of the National Center for State Courts in Williamsburg, Virginia. Bachelor's degree minimum and three years experience in information systems evaluation and analysis techniques. Judicial and/or criminal justice information systems experience required. Knowledge of PROMIS, SJIS, OBTS/CCH, and cost/benefit analysis desirable. Responsibilities include SJIS assessment, system documentation, information transfer, and technical assistance activities. Good writing, communication, and analytical skills required.

Position involves some travel throughout the United States. Salary negotiable depending on background, training and experience. Position available immediately. Applications must include resume, salary history, and salary desired. Personnel Office, National Center for State Courts, Dept. SJIS, 300 Newport Avenue, Williamsburg, Virginia 23185. EOE/MF.

PROGRAMMERS • SYSTEMS ANALYSTS
SOFTWARE SPECIALISTS • IBM • HONEYWELL
DEC • COBOL • ASSEMBLER • RPG

Major U.S. Companies Want To Interview You.

Major U S companies will be Dallas and Houston to interview computer professionals for HUNDREDS OF POSITIONS Nationwide in the $14,000 to $28 500+ salary range These key positions could be filled by invited candidates attending the CAREER ADVANCEMENT CONFERENCE sponsored by Control Data Cybersearch •

If you have solid data processing experience you won't want to miss this outstanding career opportunity Find the job that's right for you, at the salary you want, with the companies you want to interview All at ONE location NO COST NO CONTRACT NO OBLIGATION to you now or upon hire

To participate, you MUST register Call Cybersearch any weekday 9 A M to 7 P M Out-of-towners call collect For reasons of confidentiality, if your current employer is an attending company we will notify you immediately

Those out-of-town candidates who are invited by Cybersearch will be reimbursed for reasonable transportation expenses

Call or write conference coordinator at office nearest to you.

CONTROL DATA CYBERSEARCH INC.

[illegible]

Branch Manager

Opening in Tulsa, Oklahoma

Datapoint Corporation is the leader in "Dispersed Data Processing". We have experienced a continuous annual growth of 45% for the past five years, with the last quarter setting new records in all areas. Due to this unprecedented growth, we offer you a world of opportunity both personally and professionally.

We are seeking a Branch Manager with a minimum of 7 years experience in data processing service operations. The ideal candidate will possess a background in the remote processing/telecommunications environment. You will be called upon to supervise work leaders and field service personnel. Managerial experience is essential.

We offer outstanding compensation and growth potential. Qualified applicants are invited to send resume in confidence to: Mr. Dan Haynes, Datapoint Corporation, Mail Station M-83, 9725 Datapoint Drive, San Antonio, Texas 78284.

DATAPOINT CORPORATION

The leader in dispersed data processing

An Affirmative Action Employer Committed to Equal Opportunity

---

Performance Measurement and Evaluation

Our Performance Evaluation group seeks talented professionals to help design future high-performance computer systems. You should have a broad base of experience in computer system performance measurement and evaluation and be familiar with most of the following: computer system organization; operating systems structures; hardware monitors; software monitors; computer performance evaluation methodology. Combined hardware and software experience with the system 370 or Amdahl 470 is desirable. We have immediate openings for the following positions.

PERFORMANCE MEASUREMENT SPECIALIST

You will be responsible for the development of measurement methodologies to provide measurement support of future product development. The position requires experience with computer system hardware and software operation and use of measurement tools and methods. Please indicate 4921-E on your response.

WORKLOAD DEVELOPMENT SPECIALIST

You will be responsible for developing workload systems to provide a basis for controlled computer system measurement and evaluation. You will work with a team of professionals doing research of computer system workload classification, analysis, creation and synthesis. MVS or related systems experience is necessary, and a familiarity with online and database system exercisers is desirable. Please indicate 4922-E on your response.

We're looking for exceptional talent. You can expect an exceptional compensation and benefits package. Please direct your response to Employment Department, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. We are an equal opportunity employer.

amdahl

SYSTEMS ANALYSTS/SENIOR PROGRAMMERS

exec is a systems development firm, established in the East and emerging in the Southwest. Professional staff positions are available in Northern Virginia and Texas.

exec INC is seeking experienced challenge-oriented ADP professionals with accounting, data base and management applications expertise on large-scale computer systems; energy industry experience a plus.

exec INC is offering unique opportunities and competitive salary to outstanding candidates seeking to grow professionally in a system development or management consulting environment.

exec INC

Send your resume with salary history in strict confidence to:

Professional Personnel-CW
Suite 306, 1911 N. Ft. Myer Dr.
Arlington, Virginia 22209

An Equal Opportunity Employer

Sr. Programmer/ Analyst

at Henderson Mine Climax Molybdenum Company

Requires 3 years experience in scientific or general data processing. DP background should include DOS/VS, ANS COBOL, FORTRAN and VSAM. We operate on IBM 370-148, 2-MEG, running VM and DEC 2050.

We offer competitive salaries, extensive company paid benefits and a great measure of stability.

Henderson mine is located in the center of the mountain recreational activities and is within commuting distance of Denver, Car pooling is available.

For immediate consideration send your resume in confidence to:

Manager,
Employee Relations

Henderson Mine
P.O. Box 68
Empire, CO 80438

Equal Opportunity
Employer M/F

SYSTEMS/PROG. MANAGER

Enjoy Blue Grass County living in a University influenced cultural environment. Challenging position with Ky's fastest growing computer co. Selectee will manage staff of 11-15 for implementation of new bank applications including On-Line CIF and Teller Terminals. IBM COBOL, ALC, DOS and online experience desired. Salary up to $25K based on qualifications. Other Analyst/Prog. positions available. Submit resume to Duane Robinson, MetriData Computing, Inc., P.O. Box 1748, Lexington, KY 40507.

---

computer professionals

Step ahead in the SAN FRANCISCO BAY AREA

Data Base Analyst to $28K

Design physical & logical IMS data base. Will be the technical consultant to the applications developmental staff.

Systems Programmers to $30K+bonus

SF Bay Area computer manufacturers need operating systems internalists who enjoy working with users. Will be involved in benchmark testing & presentations.

CALL COLLECT, COME IN OR WRITE

303 Sacramento Street
San Francisco, CA 94111
(415) 398-3535

Employers pay all fees.
Member of National Computer Assoc.

THE COMPUTER RESOURCES GROUP INC.

IBM S/3 MODEL 15D
PROGRAMMER/ANALYST
CHEYENNE, WYOMING

Immediate opening for the right individual with the following qualifications:

- Minimum 3 yrs. experience on IBM S/3
- RPG II and Cobol
- CCP experience definite asset
- Banking knowledge desirable
- Ability to work projects from design stage thru documentation
- Able to communicate effectively with user departments

If you have these qualifications we can offer you an excellent position in a growing bank with excellent employee benefits. Cheyenne is a growing western city of 40,000 located near the Rocky Mountains, only 90 miles from Denver, with fine outdoor recreation.

Please send current resume, with salary history, salary requirements and availability to:

Personnel Officer
AMERICAN NATIONAL BANK
P.O. Box 1528
Cheyenne, Wyoming 82001
An Equal Opportunity Employer

Analyst Programmer

Systems Programmer

"THE BEST OF TWO WORLDS"

GROW with a corporation that:

- is approaching a billion dollars in sales
- Projects EDP growth of 60% within 5 years
- Progressive, innovative management-including flex time

ENJOY the 4 seasons of Rurban (rural-urban) Central Wisconsin. Outdoor sports (fishing, hunting, etc.) Indoor sports (swimming, basketball, golf driving range, racquet ball & exercise room) at our new World Headquarters.

Successful candidates will have at least 6 years in large IBM Installations with DS/DC, programming, analyst programming or systems programming, having proficiency in related languages and a track record of successful growth. We offer an excellent salary, benefits (Including Health Maintenance Organization) and REAL career opportunity. Please send your resume with earnings history in confidence to:

Mr. Marvin Bell
SENTRY INSURANCE
(414) 276-4554
633 W. Wisconsin Ave.
Milwaukee, WI 53203

equal opportunity employer m/f

Engineering

3 top engineering managers sought by Fortune 100 microprocessor company

PRIME GEOGRAPHIC LOCATION

We're a Fortune 100 company and a leader in electronic business systems. We're seeking three senior level engineering managers to lead the way in advanced POS, DNA, and communications development. The individual should be able to effectively manage up to 50 highly regarded professionals.

If you have a BS or MS in Engineering plus 5 to 8 years experience in systems and software, most recently as a project leader or manager, and have demonstrated leadership abilities in one of these areas, we look forward to reviewing your qualifications.

Terminal Development Manager

To supervise and direct a product design group engaged in the development of microprocessor-based point-of-sale terminals. Will be accountable for related hardware, software, firmware development.

Systems Engineering Manager

To supervise and direct a group engaged in developing systems configuration and system simulation as it relates to retail products. Will develop systems architecture, simulation models and performance analysis.

Section Manager— Communications Development

Will develop both SDLC and asynchronous communication Protocols, to include hardware and software, as they relate to POS terminals.

The above positions offer excellent prospects for growth, and are located in one of the most beautiful and desirable living areas on the Eastern seaboard. For prompt consideration please send resume and earnings history in strictest confidence to:

CW Box 1576
797 Washington St.
Newton, Ma. 02160

An Equal Opportunity Employer

CSC

COMPUTER PROFESSIONALS

$$\frac{c\triangle t}{\triangle x} = \text{CSC}$$

ENTER THE FOURTH DIMENSION

... at Computer Sciences Corporation. Your future is relative only to your goals. CSC's Defense Systems Division is at the leading edge of tomorrow's State-of-the-Art, and is a leader in fourth generation systems engineering and integration, with software as the leading element. We offer you unlimited opportunities for professional growth in an upward mobile environment where people really count. If you have the knowlege and background, the opportunity is HERE... and the timing is NOW. With your experience in Programming, Analysis or Systems Design, you can become a highly visible member of our Information System Staff as we enhance the State-of-the-Art in the following areas:

- **MANAGEMENT INFORMATION SYSTEMS**
- **COMMUNICATIONS**
- **COMMAND & CONTROL**
- **SYSTEMS ENGINEERING H/W S/W F/W**
- **TACTICAL DATA SYSTEMS**
- **ELECTRONIC SECURITY**
- **AUTOMATED LOGISTICS**
- **WEAPONS SYSTEMS**
- **SUBMARINE SYSTEMS**

LOCAL INTERVIEWS

Will be held within the next 60 days in the following cities: Minneapolis /St. Paul, Pittsburgh, Orlando, Milwaukee, Cleveland, Huntsville, Long Island, Columbus, Los Angeles, Providence, Chicago and Indianapolis.

We offer an excellent salary and comprehensive benefits package. To propel yourself into the future you've planned, call us collect to arrange a local interview or send your resume to:

Anne M. Lynch (609) 234-1100

EVENING & WEEKEND LOCAL INTERVIEWS AVAILABLE

Look for us at the NCC in Anaheim, CA
June 5th through 8th

COMPUTER SCIENCES CORPORATION

Defense Systems Division
P.O. Box N
Moorestown, NJ 08057
Major Offices and Facilities throughout the World
Equal Opportunity Employer M/F

MANAGER DATA PROCESSING

International, multi-company, transportation group headquartered in Great Falls, Montana seeking a responsible manager for its data processing center.

Progressive, self-starter required with experience in implementing on-line financial/operational control systems. RPG II programming, systems design and analysis required. Burroughs B1700 exposure helpful.

Position reports to Vice President/Controller. Salary commensurate with experience.

Reply in confidence with salary history to: John Ulias, Transsystems, Inc., P.O. Box 2644, Great Falls, Montana 59403.

Equal Opportunity Employer

PROGRAMMERS

Exciting career opportunities exist in the midwest with our dynamic team of computer consulting professionals. Openings in:

INDIANAPOLIS
SPRINGFIELD, IL
CHICAGO

Here's your opportunity to make maximum use of your 2 year background in large scale IBM systems under IMS. To qualify you'll need strong experience in:

PL-1 or COBOL
(Under IMS or CICS)
High Productivity

Any exposure to ALC, DEC, 3790 and systems for manufacturing, government, health insurance or similar industry a plus. As a member of our professional staff, you'll be rewarded with an excellent salary and benefits. For more information send a letter or resume to Don Breitfelder or,

CALL COLLECT (312) 786-0220
(10AM - 4PM)

INDECON, INC.
300 South Wacker Drive
Chicago, IL 60606
since 1966
An Equal Opportunity Employer M/F

Data Processing Career Opportunities In Historic Brooklyn Heights

We are offering challenging opportunities in a progressive utility with a rapidly expanding computer center. Located in Brooklyn Heights, a stone's throw from the Brooklyn and Manhattan Bridges, our compensation, benefit and career development packages are designed to attract and keep top DP professionals.

Housing two 370/158's, the data center supports over 270 on-line terminals, as well as a TSO network and numerous batch applications. This expanding environment offers the following openings:

SYSTEMS PROGRAMMER TRAINEES

Application programmers with at least 1-1/2 years experience in BAL, JCL and utilities, and with a desire to enter the challenging field of Systems Programming are needed to fill immediate openings. IBM and in-house training in the fields of MVS, CICS, TSO, IMS, VTAM, etc. will be given as part of the development process.

SYSTEMS PROGRAMMERS

MVS or SVS-trained system programmers with at least 3 years in the field are necessary to fill immediate responsibilities. Any CICS or IMS experience would be a plus.

PL1/BAL PROGRAMMERS

Programmers with 2-3 years experience and familiarity with JCL and TSO are required for immediate openings in challenging systems development and maintenance activities. IMS and CICS background would be a plus, however, in-house training programs are available.

Please forward your resume to Mike Finnagan indicating position of interest and current salary.

Brooklyn Union Gas

195 Montague Street, Brooklyn, New York 11201

PROGRAMMERS, you may have had some bad experiences in your career advancement, with employers, or with amateur placement agencies. You can put a stop to that by using the professional services of the N.C.A. firm nearest to you. It is the very best in your area or they wouldn't be a member of N.C.A. Then you won't have to say you're sorry. No charge to you. No obligation. Confidentiality is assured.

National Computer Associates

CHICAGO
Thomas Hirtz and Associates, Inc
150 N Wacker Drive, Suite 1700
Chicago, Illinois 60606
Telephone (312) 236-5079

DALLAS
DataPro Personnel Consultants
4255 L B J Freeway
Suite 182
Dallas, Texas 75234
Telephone (214) 661-8600

DETROIT
Electronic Systems Personnel
Prudential Town Center
3000 Town Center, Suite 2580
Southfield, Michigan 48075
Telephone (313) 353-5580

FLORIDA
Data Sciences Personnel, Inc
Suite 209, 19490 N W 7th Ave
Miami, Florida 33169
Telephone (305) 685 7891

HARTFORD
Compass, Inc
900 Asylum Avenue
Hartford, Connecticut 06105
Telephone (203) 549 4240

LOS ANGELES
Constellation Enterprises
Suite 900, 3250 Wilshire Blvd
Los Angeles, California 90010
Telephone (213) 487 0810

MINNEAPOLIS/ST. PAUL
Electronic Systems Personnel
801 Nicollet Mall, Suite 1710
Minneapolis, Minnesota 55402
Telephone (612) 338 5714

NEW JERSEY
Systems Search II
75 South Orange Avenue,
South Orange, N J 07079
Telephone (201) 761-4400

NEW YORK
Betal Associates Inc
405 Lexington Avenue
New York, New York 10017
Telephone (212) 687 0906

NORTH CAROLINA
TechForce Inc
1049 E. Wendover Ave
P O Box 8888
Greensboro, N Carolina 27405
Telephone (919) 373-1481

PHILADELPHIA
Systems Personnel
207 Fox Lane
Wallingford, Pa. 19086
Telephone (215) 565-2920

PITTSBURGH
Electronic Systems Personnel
108 Lawyers Building
428 Forbes Avenue
Pittsburgh, Pennsylvania 15219
Telephone (412) 391 8490

SAN FRANCISCO
The Computer Resources Group
Agency Inc
303 Sacramento Street
San Francisco, California 94111
Telephone (415) 398 3535

SYRACUSE
CFA Associates Personnel Inc
(Agency)
2530 James Street
Syracuse, New York 13206
Telephone (315) 463 5225

WASHINGTON, D.C.
ESP Systems Corporation
Suite 210
1211 Connecticut Avenue N W
Washington, D C 20036
Telephone (202) 833 8040

PROGRAMMER SYSTEMS APPLICATIONS

The Las Vegas Operations of **EG & G, Inc.**, a dynamically diversified technological corporation broadly based in the electronics industry, currently has openings for Systems Applications Programmers with recent experience in real-time, mini-computer based data acquisition and control systems. Positions require technical degree and a minimum of two years experience in programming and software planning or analysis at the systems level. Familiarity with DEC PDP 11 operating systems is a definite plus.

Major responsibilities will be problem definition, specification and design of system and application level software for a multi-computer data acquisition network. These duties will be performed in conjunction with project management which coordinates problem statements and proposed solutions. Other responsibilities will include some implementation and coding, software verification and providing technical assistance to a variety of software design efforts.

EG & G offers an attractive benefits program including dental coverage as well as a fine starting salary commensurate with capabilities and experience. Interested applicants are encouraged to submit resumes with salary particulars in confidence to

EG&G

Industrial Relations
Services Department
P.O. Box 1912
Las Vegas,
Nevada 89101

We are "in fact" an equal opportunity employer
U.S. Citizenship Required

SYSTEMS
PROFESSIONALS
NATIONWIDE SERVICE

Project Leader To $28K
Philadelphia - Exp in trust area, stocks or its systems. Fortran bkgd a plus.

Asst. Director To $40K
Systems devel, on-line syst, corp hq, large scale mfg.

Mgr Res. Sys To $40K+
Bio/chem or pharm sys exp. Supv lrg staff, IBM OS.

FO-R-T-U-N-E DATA
DIV FORTUNE
PERSONNEL AGENCY
505 5th Av. NYC 10017
(212) 682-8600
Company Inquiries Invited

BUSINESS PROGRAMMER

Wide variety of business applications. Burroughs B-1726, COBOL, DMS II, on-line. 2 years experience required. Education may replace no more than 1 year experience. Starting salary $15,000. Good benefits, challenging work. Phone: (509) 865-5121.

Art Batin, Personnel Officer
Yakima Indian Nation
P.O. Box 151
Toppenish, WA 98948

COMMONWEALTH OF VIRGINIA

SYSTEMS SOFTWARE ADMINISTRATOR

Immediate opening for a person to direct the activities of a high technology systems support group working in MVS, VM, OS/VS1, IMS, EXEC 8, DMS 1100, teleprocessing, data base and other computer support areas. Requires applicable degree plus 7 yrs. experience in systems activities and data processing management.

SYSTEMS SOFTWARE PROGRAMMERS

Immediate openings at several state computer facilities for systems support personnel. Experience desired in VM/370, and/or DOS/VS and/or MVS or OS/VS-1.

Positions require degree plus 2-4 yrs. experience. Additional experience can substitute for college education.

Opportunities exist for professional training and education as well as career development. Compensation includes state benefits package.

Call (804) 786-6041 or send resume to:

BOBBIE HUGHES
DEPT. OF COMPUTER SERVICES
201 Eighth St. Office Building
Richmond, Virginia 23219
EOE - M/F

COMPUTER SOFTWARE SALES TRAINEE

Due to exceptional growth, a unique opportunity to join a leader in the proprietary software market is now available.

You will:

- Be selling proven software products to high level corporate management.
- Be working out of our branch office in the Chicago or Los Angeles area under the direction of a senior sales person.
- Be given complete training.
- Be supported by proven marketing programs that produce highly qualified leads.
- Receive a base salary & commission & expenses and exceptional fringe benefits.

If you:

- Are a recent college graduate (MBA preferred).
- Don't mind travel.
- Have some computer-related knowledge or experience.
- Desire an excellent growth opportunity.

Send your resume to arrange an appointment for interview to:

Mr. Sherman A. Drusin
Vice President
Program Products Incorporated
95 Chestnut Ridge Rd.
Montvale, N.J. 07645
an equal opportunity employer M/F/H

PROGRAMMERS

Growing Computer Software Company requires Programmers with COBOL or ALC experience. Openings in Huntsville, Alabama.

General Computer Services, Inc.

P.O. Box 5148
Huntsville, AL 35805
(205) 539-9492

DATA PROCESSING PROFESSIONALS

Are you considering a career change for 1978? If so, we have immediate openings with the most progressive clients in North Carolina, nationwide and international. Immediate needs include:

Syst. Analyst	to $30K
Bus. Syst. Analyst	to $25K
Syst. Prog	to $24K
Sr. Proj. Analyst	To $21K
Prag Analyst CICS	to $20K

If interested send resume or call Continental Personnel, Inc., P.O. Box 11321, Charlotte, N.C. 28209 (704) 525-2160.

SOFTWARE SPECIALISTS DATA ADMINISTRATION

The Tennessee Valley Authority in Chattanooga, Tennessee, is seeking qualified individuals to fill immediate openings as Data Administration Software Specialists. Requires a bachelor's degree with a minimum of five years of technically oriented professional experience, including extensive knowledge and experience with OS or MVS, and OS/VS JCL. Opportunities are available as Data Dictionary or Data Base Management Software Specialist. Experience with LEXICON and/or SYSTEM 2000 is desirable.

Salary commensurate with experience. Excellent benefits. Send resume (include social security number with name) in confidence to:

TENNESSEE VALLEY AUTHORITY
Employment Branch (CW-0043)
Room 240 MIB
Knoxville, Tennessee 37902

TVA may consider for appointments only U.S. citizens and others eligible for payments under section 602, Pub. L. 94-363, and section 750, Pub. L. 94-419.

An Equal Opportunity Employer

WANG
WANG
WANG
WANG

Software Technical Writers

WANG is looking lor software technical writers to document our new state-of-the-art 2200VS computer system. We need people with the technical ability to understand the various lacets of a modern computer system and the writing ability to explain them clearly and coherently to others. We offer plenty of growth potential and the opportunity to work in a creative, challenging environment where individual achievement is recognized and rewarded. Our requirements are:

- Knowledge of at least one high level language, preferably COBOL, BASIC, or RPG II, (Knowledge of an Assembler language would be a plus.)
- Familiarity with a major computer operating system
- 1-3 years experience documenting or working with system soltware (programmers with a flair for writing are invited to apply).
- The initiative and creativity to follow a project through from initial research to final copy.

If you meet these requirements, we'd like to talk with you.

Excellent salaries and earning potential plus superior company benefits. Please send resume including academic background and salary history and requirements to:

Linda G. O'Connor
Career Opportunities
(617) 851-4111

WANG
LABORATORIES, INC.
One Industrial Avenue
Lowell, Massachusetts 01851

We are en equal opportunity/
affirmative action employer.

EDP Growth Opportunities

Stop & Shop, New England's largest retail organizetion (Boston based), is seeking several EDP professionals to join our growing Information Systems Division located in our modern office faciiities in North Quincy, Massachusetts.

You will support the design and operation of progressive retail business systems for the corporation and distribution systems for our rapidly growing food processing division.

Mini Programmers

We are currently involved in e very ambitious project to form an extensive distributed processing network to enhence the capabilities of our large central IBM Data Center. The distributed network, now in the development stage, uses TI's, 960's and DXS equipment. Applications involva e Corporete wide order replenishmant distribution system, and distribution systems in our food processing division and Bradlees chain. An extensive mini programming background or exposure to TI's assembly or transaction language will qualify you for these challenging and creative positions.

Programmer Analysts/Project Leaders

Our shop is at the leading edge of state of the ert technology in IBM 370 and distributed processing business applications. We are currently doing on-line IMS-DL1 programming. You will design programs and implement systems in e largely developmental mode in e 370/145, 158 VM/VS1/OS Cobol environment. You will use en unencumbered time-shered system of VM/CMS to executa your programs. Two years applications programming experience with Cobol required. IMS/DL1 exposure e big plus.

To inquire, send resume, including salery history, or call:
Ken Loomis, Information Systems Division Personnel
The Stop & Shop Companies, Inc.
P.O. Box 369, Boston, MA 02101 (617) 463-4546

The Stop & Shop
Companies Inc.

An Equal Opportunity Employer M/F

COMPUTER SYSTEMS ANALYSTS

SDC Offers the Best

When you're a leader in the computer software industry, you can afford to bring the best to your employees. System Development Corporation does just that et our location just outside of Boston. Immediate career openings are available for Computer Systems Analysts with 3-10 years experience in any of the following areas:

- Command and Control/intelligence systems
- DEC 10 and PDP 11 applications and systems programming experience
- MIL-STD-490 software & design documentation experience,
- Radar tracking and processing experience
- Familiarity with phased-array radar technology & operations helpful
- Working knowledge of FORTRAN: prefer CDC Cyber background.

SDC offers a benefits package that compares with the best. Consider:

- 4 weeks paid vacation
- Free medical, life and dental insurance
- 100% educational assistance
- Top salaries

If you are ready to step up to further professionel success and personal growth, send your resume end salary requirements to: Claude Madonna, System Development Corporation, 4 Milltle Drive, P.O. Box 98, Lexington, Mass. 02173.

SDC. The place where people make the difference.

We are an equal opportunity employer M/F/H

System
Development
Corporation

PROGRAMMER/ ANALYSTS

Opportunity to become a key team member in the development of large real time mini based wagering systems. Capability to perform programming and analysis tasks in a real time transaction oriented anvironment. Assembly plus one high level language required. We offar excellent starting salary, and a comprehensive benefit program. For immediate consideration, please submit your resume including salary history to:

American
Totalisator
Company, Inc.
383 Hillen Road,
Towson, Md. 21204

EOE/MF

SALES/TECH SUPPORT

$15-30K NOW

BECAUSE YOU WANT

Better compensation, prof. environment, choice of geographic locations, fastar & more significant promotions, product integrity.

OUR CLIENTS OFFER

Key sales/marketing and support positions in choice geographic areas. We have current critical openings with several leading Mini and Peripheral Vendors in the Sunbelt metro areas: Atlanta, Charlotta, Columbia, Dallas, Houston, Miami, Nashvilla, N. Orleans, Orlando & Tampa.

IF YOUR EVEN THINKING

About updating YOUR career, we have sales Pkgs. from $24K to 60K, Technical Support $18-33K, with industry leading benefit and stock purchase plans. For YOUR next raise or promotion, call John Cummings of our firm or send resume:

FRANK LEONARD
PERSONNEL
1221 No. Westshore Blvd.
Suite 100
Tampa, FL 33607
(813) 872-1853

ANNOUNCING A NEW POSITION:

DIRECTOR, INFORMATION SERVICES DEPARTMENT

For a Major California County Government

The emphasis is on management and administrative skills, attitudes and orientation.

In a location overlooking San Francisco Bay, a group of department heads, a member of the Board of Supervisors, and the menegament consulting team of Jan and Paul Weber met recently to define the qualifications for a very special person: the Director of a new Information Services Department for Alameda County.

This new Department will play a major role supporting the delivery of criminal justice, weltere, heelth care, and other essential services to over one million peopla. It will combina the existing cantralized Data Processing Center with a new Information Management Division, which will coordinale Countywide distributed systems, dala bases, standards and training.

The Department's budget of ten million dollars will include a staff over over 200, two 370/158's and a 370/155 serving more than 600 terminals in eight Bay Area counties. Distributed equipment will incude twelve minicomputers, and more installations are planned.

Alameda County is locatad in a lively, beautiful, variad area of great culture, climate, history and dynemic chenge. It encompasses thirteen cities, including Berkeley, site of the University of California.

To meet tha challenge of this position, the Director of the Information Services Department must hava strength, intelligance and a flexible, innovative approach; be a good listener end en articulate, dynamic communicetor; display and inspire trust; have a broed menagement background including data processing; work affectively in County government; understand current issues and future trends of this technical field; have a service philosophy end be abla to instill it in others; be able to ettrect, select, and retein quality personnel; and be committed to affirmative action.

Tha position offars great challenge and equally great potantial for success. Over a year of studias has set the stage for craating tha Information Services Department on July 1, 1978. Tha Director should be aboard soon thareaftar to take charge of the new Department and oversee the selaction of an Assistant Director for tha new Division. Recognizing tha need for an axceptional individual, tha County is offering a salary negotiabla to $45,000 and an extensive package of management benefits.

If you feel that you are this special parson and that this challenging position will provida you with tha growth and job satisfaction you are looking for, act now. Mail your resuma to Tom Duncan, Alameda County Parsonnal, 1221 Oak St., Oakland, CA 94612. Or call him at (415) 874-7111. Alameda County is an Equal Opportunity/Affirmative Action Employar.

JOIN THE GROWTH AT LEASAMETRIC.

IMMEDIATE OPENINGS NATIONWIDE.

Leasametric, an affiliate of Trans Union Leasing, and a national leader in the short-term rentals of electronic test & measurement instruments, communications equipment, and I/O terminals, has immediate territorial openings nationwide and in Canada for:
• Branch Managers • Field Sales Engineers • Staff Sales Engineers

We are looking for proven professionals with experience in either test & measurement instrumentation or EDP equipment.

This is a career opportunity to join the nation's fastest growing, most innovative rental/lease company in a $100 million-plus industry.

To the right individuals we offer an excellent compensation/benefits package.

Please send introductory letter, résumé, and salary requirements in confidence to:

822 Airport Blvd . Burlingame, CA 94010
Attn Sales Manager (415) 342-7111

**21 Inventory Centers
Coast-To-Coast**

Leasametric

BUSINESS SYSTEMS DEVELOPMENT OPPORTUNITIES

DAVID CRYSTAL ® is a nationally known apparel division of General Mills Inc. with diversified product lines of mens, womens & childrens better wear.

We have several immediate openings for senior programmer/analysts in our state-of-the-arts application systems. If accepted, you will perform in a highly visible, highly critical area of new development.

Candidates should be degreed in a business or information systems related area & have 2 or more years exp in phases of systems development. Apparel background, though desirable, is not essential. A wide range of benefits and attractive salary is offered along with outstanding career opportunities.

Send Resume With Salary Requirements To:
PERSONNEL DIRECTOR

DAVID CRYSTAL®

498 7 AVE NEW YORK, N.Y. 10018
An Equal Opportunity Employer M/F

EDP AUDITOR

Gerber Products Company has an immediate opening for an EDP Auditor. First consideration will be given to candidates with the following qualifications:

Business Degree - Accounting or Computer Science

Ability to program in a major computer language; preferably COBOL. Experience in EDP Auditing, Systems Analysis or Data Processing Administration.

This position is at Corporate Headquarters, Fremont, Michigan, and involves less than 25% travel. The company utilizes a 370/148 in communication with System 3 computers at plants throughout the United States.

Please send your resume in confidence to:
**Stan M. Houck
Employment Supervisor**

GERBER PRODUCTS COMPANY

**445 State Street
Fremont, Michigan 49412**
An Equal Opportunity Employer

PROGRAMMERS

[illegible]

**SEARCH
E.D.P., INC.**
Personnel Consultants
13773 N. Central Expwy
Suite 1305
Dallas TX 75243

ALL FEES PAID BY EMPLOYER

COMMUNICATIONS PROGRAMMER

University of Kansas

The University of Kansas Academic Computer Center seeks a qualified person as a full-time Communications Programmer. Primary responsibilities include: programming mini-computers to support remote access to a Honeywell 66/60; data communications consulting and problem diagnosis. Salary $13,500 to $14,500 depending on qualifications and experience. Submit resume to David L. Nordlund, Assistant Director, P.O. Drawer 2007, University of Kansas, Lawrence, Kansas 66045 on or before June 5, 1978.

Equal Opportunity/
Affirmative Action Employer

PROGRAMMER ANALYST

For a rapidly-expanding electric utility located in beautiful Colorado West. IBM 370/135, DOS/VS, Power/VS, CICS. Two positions:

.. Fortran and Assembler in an engineering, statistical or scientific environment.

.. Business systems, COBOL, Top Down design and coding, HIPO. CICS Command Level languages a plus.

Dept. AY
**COLORADO-UTE
ELECTRIC ASSN**
Box 1149 Montrose, CO 81401
An Equal Opportunity Employer

INTEL 8080 PDP 11 PROGRAMMERS and ANALYSTS

8080 programming/design experience on operator-interactive data entry stations is required. OCR experience is desired but not required.

OR

PDP 11 Data Base Experience.

*Long hours, Intense work
Creativity, and Pride are
required and rewarded.*

Call (don't write):
Leonard Jowers
Sullivan, Long & Hagerty
Birmingham, AL
Collect: (205) 324-7621
Equal Opportunity Employer M/F

COMMERCIAL PROGRAMMER

ODECO, a major international drilling company, has an immediate opening for a Commercial Programer with COBOL programming experience. Bachelors degree or equivalent.

We offer an excellent benefit program. Interested parties please submit resume and salary requirements to:

Tom Roundtree

ODECO

Ocean Drilling &
Exploration Company
P.O. Box 51780
New Orleans, LA 70161
An EOE/AA Employer

IF YOUR DP TALENTS HAVE BEEN PUT IN OFF-LINE STORAGE...

...We've Got the Career Programs to Get Them Back On-Line!

VP OF SYSTEMS Strong managerial and developmental capabilities. Midwest.	Sal open above 70K
MANAGER HUMAN RESOURCES Develop Human Relations function for DP community of 800 professionals. New England.	To 45K
SR. SOFTWARE DEVELOPMENT AND SYSTEMS MANAGEMENT Vendor experience required for data communications manufacturer.	To 35K +
MANAGER OF COMPUTER OPERATIONS Requires 7 years experience in large IBM installation. Southwest based.	To 32K
CONTROL APPLICATIONS PROGRAMMERS Assembler language, mini and micro-processor experience. Develop programs for computer control electronic equipment. Southeast based.	15-30K
IMS ANALYSTS/SUPPORT Requires 2 years experience in IMS applications and/or support. Southeast based.	To 25K
SYSTEMS PROGRAMMERS Requires 3 years experience in MVS, SVS or MVT. Southeast based.	To 23K
SYSTEMS ANALYST Requires generalist with IBM commercial applications. Miami	To 22K
ASSEMBLER/PARS PROGRAMMERS Requires 2 years experience in either Assembler or PARS applications. Southwest based.	To 20K
PROGRAMMER/ANALYSTS 3-4 years general programming on-line experience. COBOL. Southeast based.	To 17K

Quality of experience takes precedence over number of years. All relocation expenses paid. For complete information, forward detailed resume, including salary history in confidence or call:

**Systems Division
305/856-3120**

H. EARL SMALLEY ASSOCIATES

**2583 S. Bayshore Drive
Coconut Grove, FL 33133**
We represent equal opportunity employers m/f

SYSTEMS ANALYST /MANAGER

Service bureau seeks data processing "pro" with exp. in subscription & publishing applications. Will direct five people & coordinate on-going user needs. Prefer large mainframe exp. Programming bkgrd. req. Hi-visibility position reporting to controller. Salary to $25,000. (Fee paid.) Contact Gerry Battista.

**ROBERT HALF
PERSONNEL AGENCIES**
140 Federal St.
Boston, Mass. 02210
(617) 423-6440

ADMINISTRATIVE PROFESSIONAL

Staff position in the Computer Aided Instruction and Research Laboratory (CAIRL) of the College of Liberal Arts. The person will report to the Dean of the College and will be in charge of the CAIRL. The duties are to promote and develop the use of Computer Aided Instruction modules, and to be responsible for writing and maintaining programs used in Computer Aided Instruction and Research. Applicant should have a masters degree or Ph.D. at time of appointment. Application deadline: July 5, 1978. Effective date of employment: August 1, 1978, or later to be negotiated. Contact: Lon R. Shelby, Dean, College of Liberal Arts, Southern Illinois University, Carbondale, Illinois 62901. Southern Illinois University at Carbondale is an Equal Opportunity/Affirmative Action Employer.

Director of Corporate Manufacturing Systems

Growing multi-plant electronics manufacturer, headquartered in the Northeast, requires a profit-oriented MIS Manager to direct the activities of our worldwide manufacturing systems organization.

Reporting to our VP of Manufacturing, you will be responsible for new systems development, long and short range planning, facilities and operations and remote data processing centers. You will manage a sophisticated minicomputer network and interface with senior functional and corporate management.

We require an experienced MIS Manufacturing Manager with a successful record of accomplishment. Ideal candidate will have either plant or corporate large company experience as a Manager of MIS and be seeking new challenges and opportunities. Attractive compensation package includes stock options.

Please send resume and salary history to: Management Services Group,

**CW Box 1575
797 Washington St.
Newton, MA. 02160**
An equal opportunity employer M/F.

Programmer Analysts

CAREER OPPORTUNITIES

We have currently available several openings of the SENIOR, INTERMEDIATE and JUNIOR level for career-minded Programmer Analysts.

Requirements:

Senior Level	3-4 yrs. BAL exp. Life Insurance systems
Intermediate	2 yrs. BAL/COBOL Life Insurance exp. a plus
Junior	2 yrs. ANSI-COBOL RPG II a plus

IBM DOS Environment. JCL experience helpful.

Excellent opportunities for personal and professional growth. Competitive salary and fringe benefits.

Submit resume with salary earnings and requirements to:

Christine Kaminski, Director of Personnel
Standard Security Life Ins. Co. of N.Y.
485 Madison Ave., New York, N.Y. 10022

DATA BASE ANALYST

(Southern Florida Location)

Data Base Analyst needed to aid in:

- IMS/DB-DC Applications
- IMS Performance Monitoring/Tuning
- IMS Data Base Design

We are an IMS/VS DB/VS shop with 370/168 & 158 located in Southern Florida

You must have experience in IMS/DB-DC, COBOL and ALC.

We offer a competitive salary with excellent benefits. Apply in confidence to:

CW Box 1525
797 Washington St.
Newton, MA 02160
An Equal Opportunity Employer M/F

Dataproducts

DATA PROCESSING OPPORTUNITIES

DATAPRODUCTS has outstanding growth opportunities available in the Corporate Data Services Dept. for the following:

SR. SYSTEMS PROGRAMMERS

To evaluate and configure systems hardware. Requires 3 to 5 years Systems Programming experience with a comprehensive knowledge of operating systems and teleprocessing in a VM 370, DOS/VS, and CICS environment.

SYSTEMS ANALYST

To act as manufacturing team member in progressive IBM 370 environment aiding in design programming documentation and implementation of new manufacturing systems. Requirements include 3 to 5 years manufacturing systems design experience using COBOL for master production scheduling, inventory control and bill of material. Knowledge of RPG II, DEBOMP and BAL helpful.

We offer a highly professional environment, attractive salaries, and an excellent benefits package. To persue, send your resume, including salary history/requirements to:

Gary Bernard
Director of Personnel

DATAPRODUCTS CORPORATION
6300 Variel Avenue, Woodland Hills, CA 91365
Equal Opportunity Employer M/F

THE PRINTER COMPANY
Dataproducts

SYSTEMS ANALYST

The San Mateo Union High School District is seeking a person with a degree in public or business administration, or related field and five years recent experience in systems analysis, to plan, direct, research, develop applications. IBM 370/125. Salary range $19,464 - $23,664 excellent employee benefits. Send complete resume to:

Janet C. Fraser
Personnel Officer
San Mateo High
School District
650 No. Delaware
San Mateo, CA 94401

COMPUTER SYSTEMS ANALYST CITY OF GRAND JUNCTION

Requires bachelor's degree in data processing, acct., or related field plus 4 yrs. exp. as programmer to include 1 yr. in systems analysis and 1 yr. supervisory exp. Salary: $1170 - $1292/mo. (comm. w/ qual.): Send resume to: Personnel Office, 250 N. 5th St., Grand Junction, CO 81501, no later than June 2, 1978. *EOE*

SYSTEMS CONSULTANT

IMS-$28,000

Prominent NJ mfg. Degree, 4+ yrs. 370 & OS; MVT, ASP; IMS, with software orientation. 50% user contact. FEE PAID.

ROBERT HALF
PERSONNEL AGENCIES, INC.
522 Fifth Avenue
New York, N.Y. 10036
(212) 221-6500

TEK MEETS THE MICROPROCESSOR CHALLENGE

TEKTRONIX, a leader in test instrumentation and graphic display, has entered the exciting microprocessor field.

If your background includes software or hardware experience, and you are interested in sales or sales support, then this is your invitation to discuss joining our rapidly growing team representing TEKTRONIX Microprocessor Development Systems.

We want to show you our unique system which supports several microprocessors. This is your opportunity to explore an exceptionally promising future for both of us.

TEKTRONIX offers dynamic growth, stimulating challenge, and broad advancement potential. MDA Sales Specialist position offers a competitive base salary, incentive program, automobile and excellent benefits. Also MDA Applications Engineering position open. Both are available nationwide.

CAN YOU MEET THE TEK CHALLENGE

If you can, call us

(800) 227-8340

or send your resume to Steve Shank, TEKTRONIX INC., 985 University Avenue, Los Gatos, California 95030. We are an equal opportunity employer m/f/h

Tektronix

The Creative Alternative.

The people who created a new generation of computers offer creative people an exciting alternative.

At Amdahl, there's only one kind of job.

The kind where people become highly involved. With their work. With each other. With ideas. Where new solutions are respected and encouraged. Where your co-workers are competent, stimulating and genuinely interested in their work, too.

We've built our success on people and their ideas. And our family of exciting large-scale, high-performance computers is the result.

Drop in and talk with us. When you see how we run our organization, you may realize your best alternative.

Qualified candidates are invited to direct their response to Phil Beckhelm, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. Or call him collect at 408/746-6165. We are an equal opportunity employer.

HEADQUARTERS MARKETING SUPPORT SPECIALIST

We are currently seeking an individual to work as part of a team with major responsibilities to include consultation, benchmarking and pre-installation planning. Interface with various levels within customer management and technical staff will be required. This is an excellent opportunity for a technically rounding experience if you have a systems programming background that includes MVS internals. You should have good communications skills and experience as a team member involved in performance measurement and tuning. Please indicate 3301-E on your response.

PERFORMANCE MEASUREMENT & TUNING SPECIALISTS

Opportunities exist for experienced systems analysts or programmers who will assist and consult with customers in the area of performance measurement/tuning and benchmarking. You have at least 5 years' systems programming experience with internals level knowledge of MVS. You are conversant in IMS or CICS as they impact MVS tuning and have hardware monitor experience. Successful candidates should be able to communicate effectively and possess a good marketing posture. You will have the opportunity for some travel. Please indicate 3302-E on your response.

amdahl

EDP SPECIALISTS

career opportunities $18-$50,000

MIS DIRECTOR to $40,000. Midwest mfgr seeks indiv. to direct complete organization, systems, programming & operations. Client seeks large scale 370 OS, data base exp, solid exposure to mfg systems & proven management/administ. abilities. Refer S.B.

MGR. EDP AUDIT to $37,000. Prestitious nat. retail client req's BS/BA w/5-10 yrs EDP audit exp in retail/financial systems envir. Min travel. CPA or MBA is desirable. Refer R.M.

REGIONAL MGR. $43,000 3 bonus + car. Leading mfgr of mini-computer based turnkey sys. seeks indiv. w/sales mgmt exp in mini computers (and user, proc. control, ind'l accts, etc.). Position could lead to gen'l sales mgmt. Refer R.O.

EDP to $20,000+. Sunbelt. Numerous openings for programmer, programmer analyst, technical support, systems analyst & all related mgmt. Most operating environments needed. Refer J.S.

SYSTEMS to $29,000. Blue Chip mfgr, is leading growth corp in their industry. Seeks indiv. capable of early proj. mgmt resp. Req's BS w/4-6 yrs. significant accomplishment in mfg., financial and/or marketing systems analysis & design. Refer G.W.

EDP AUDIT SUPERVISOR $25-27,000. Fortune "200" mfgr seeks auditor to estab & manage their internal controls effort. Degree & exp in EDP audit req'd. Suburban loc. Refer A.T.

EDP MGR. to $29,000. Fortune "500" mfgr seeks degreed data processing pro w/min 7 yrs "hands on" exp with IBM 370 or NCR 200. Strong supvr skills desired. Refer J.B.

FOR FULL DETAILS ON EACH OF THESE FEE-PAID POSITIONS
CALL OR SEND RESUME TO THE RECRUITMENT SPECIALIST NEAREST YOU

PHILADELPHIA, PA 19102 — S. Burns, 1905 Chestnut St., 215/561-9300
ATLANTA, GA 30346 — R. Spang, 47 Perimeter Ctr., 404/392-0922
BALTIMORE, MD 21204 — R. Nelson, 409 Washington Ave., 301/296-4500
CHARLOTTE, NC 28202 — J. Schwab, 1742 South'n Nat'l Ctr., 704/375-0600
CLEVELAND, OH 44131 — A. Thomas, 5755 Granger Rd., 216/749-6030
FORT LEE, NJ 07024 — R. Mansfield, 2125 Center Ave., 201/947-6929
MCLEAN, VA 22101 — G. Nugent, 7921 Jones Branch Dr., 703/790-1229
NEW YORK, NY 10017 — W. McNichols, 505 Third Ave., 212/697-1920
PITTSBURGH, PA 15222 — J. Beck, 4 Gateway Ctr., 412/232-0410
PRINCETON, NJ 08540 — R. Davis, 2490 U.S. Rte. 1, 609/452-9129
WILMINGTON, DE 19810 — G. Whitwell, 2411 Silverside Rd., 302/479-5150

fox·morris
personnel consultants

The Cream of the Crop

ASC is looking for only the best programmers and analysts to expand our team of technicians. We have grown to be a leading national D.P. consulting firm as a result of the reputation our staff has achieved throughout the country. Each individual is compensated with a high salary as well as the following benefits:

Per Diem allowance (for relocation and misc. expenses)
- Paid Vacation and Holidays
- Paid overtime
- Company-Paid Major Medical Insurance
- Life insurance for you and your family
- Welcome back bonus for previous employees

Call COLLECT about our numerous Programmer/Analysts openings in 6 national offices and you will see why the best come to ASC.

(313) 362-4700

ALLEN SERVICES CORP.

DETROIT BRANCH OFFICE
755 BIG BEAVER ROAD
TROY, MICHIGAN 48084

or call TOLL FREE (800) 543-7583.

EOE

Programmer Analysts

We are adding to our Information Systems staff and have immediate openings for experienced Programmers and Systems Analysts.

The individuals selected will have 2 years NCR NEAT/3 or NCR COBOL experience. CIF, CIRF and/or commercial banking application experience preferred.

We offer an excellent starting salary plus an outstanding fringe benefit program. Send resume to:

Personnel Director
Winters
National Bank & Trust Co.
Winters Bank Tower
Dayton, Ohio 45401

An Affirmative Action Equal Opportunity Employer

SENIOR PROGRAMMER ANALYST PROGRAMMER ANALYST

BALL STATE UNIVERSITY has openings for the right individual to work in an academic atmosphere. Senior Programmer Analyst: perform systems analysis of user requirements. BS in computer science with 2-3 years experience required.

Programmer - Analyst: perform some programming in combination with analysis of systems and programming needs. BS in computer science with 1-2 years experience preferred. Application deadlines 6-2-78. Send resume and salary requirements to:

Personnel Services
BALL STATE UNIVERSITY
Muncie, Indiana 47306
An Equal Opportunity/
Affirmative Action Employer

MARYLAND VIRGINIA

Proj Leader	To $24K
Sys Analyst (2)	To $22K
Prog Analyst (2)	To $20K
Lead Prog	To $19K
Programmers (4)	$14-20K

We are currently staffing 4 major corps in Virginia, Maryland and Southern PA. Clients seek exper with large scale IBM DOS/OS with COBOL and/or ALC. Bkgrd in mfg, banking, or insurance appropriate. Relocation & all fees paid by client cos. Contact Ron Nelson, EDP Specialist, (301) 296-4500.

FOX MORRIS
Personnel Consultants
409 Washington Ave.
Baltimore, MD 21204

DATA PROCESSING MANAGER

City of Naperville. Opening to assume responsibilities as Manager of Data Processing. Installation has IBM S/3-150 providing batch and teleprocessing services on a multishift basis to four municipalities with a large variety of users and applications. Current staffing is 13 personnel with contract systems personnel available for special projects. Position reports to the Assistant City Manager and is primarily administrative in nature. Prior experience in Data Processing management required. A degree in computer science and working knowledge of S/3-15 CCP desirable. Salary range $18,950 - $25,650. Excellent benefit program. Send resume with salary history to: Jack Tanison, Personnel Officer, City of Naperville, 175 W. Jackson Naperville, Illinois 60540.

- Equal Opportunity Employer -

PROGRAMMERS TO $20,000

Multiple openings w/PHILA area INDUSTRIAL GIANT. 3+ yrs ANS COBOL from lge scale IBM environ w/knldg IMS data base sys reqd. ASSEMBLER & RPG II knldg highly pfrd. Outstanding opty offering planned career path & excel benefit pkge; including profit sharing.

For confidential attention, please call or forward resume to:

ROBERT HALF
PERSONNEL AGENCIES
2 Penn Center, Suite 709
Philadelphia, PA 19102
(215) 569-4990

ASSISTANT PROFESSOR EDP

Anticipated faculty opening for Asst. Prof. in EDP in 2 yr. AAS program, 1977-78; MS and 3 yrs. industrial exp. in one or more of the following: Programming Languages, Computer Information Systems, Operating Systems, Data Structures, mini/micro computers, 10 mos., $15-17,500.

Resumes to be received by May 31, 1978 by the Dean of Academic Services, Monroe Community College, Box 9720, Rochester, N.Y. 14623.

An Equal Opportunity/Affirmative Action Employer.

IMS ANALYSTS/ DESIGNERS

Mainline computer services organization offers professional opportunity to qualified candidates - wide variety of applications and hardware - State of the Art Software - professional environment with planned professional growth - competitive salary and benefits plan - COBOL or Assembler experience - CICS and PL1 helpful - positions available in Baltimore, Buffalo, Chicago, Pittsburgh, Rochester and Syracuse locations - call (301) 288-5990 or rush resume to -

Computer Task Group, Inc.
Coltamer Office Bldg.
E. Syracuse, N.Y. 13057
Equal Opportunity Employer M/F

COMPUTER PROGRAMMER

Section of cardiology at University Medical Center is seeking an Application Progrmamer experienced in real time operating systems. Application includes cardiovascular instrumentation, interfacing, software and data based development. Experience in FORTRAN and assembly language program required. Degree in mathematics, general engineering, computer science or bio-medical engineering preferred.

Excellent starting salary and comprehensive benefit program. Send resume in confidence to Mr. Phil Olson.

Rush Presbyterian
St Luke's
Medical Center

1725 W. Harrison St. Chicago, IL 60612
an affirmative action equal opportunity employer m/f

COMPUTER PERFORMANCE MEASURMENT ANALYST

The nation's central bank is seeking an individual to conduct computer performance evaluation throughout its major Federal Reserve sites.

Evaluations are conducted using Hardware monitors and on-site Software monitors, measuring utilization and performance levels on the various computers and associated peripheral devices. Recommends corrective action regarding equipment installation/configuration problems to both Technical and Senior level management.

Individual should have a BA/BS in Math, Computer Sciences or related field; solid technical background including ALC and OS JCL; general understanding of operating systems, time-sharing systems, and Data-Base systems. Prefer experience in OS/VS internals performance measurement using Hardware and/or Software monitors, Hardware/Software planning and a general understanding of the logical design of circuitry. 20-30% travel required.

Excellent compensation package in addition to a complete benefit program. You are invited to send a resume of your professional qualifications, including salary history to Kathy Warehime:

BOARD OF GOVERNORS OF
THE FEDERAL RESERVE SYSTEM
Washington, D.C. 20551

Equal Opportunity Employer

PROGRAMMER/SYSTEMS SUPPORT ANALYST

Challenge... Opportunity...
Professional Development...
Sun-belt location...

Sound interesting? You may take advantage of these if you have programming experience with a large scale system involving interactive computer graphics, inventory control, and financial systems. Systems support position requires knowledge of JCL, utilities, and assembler.

To pursue these opportunities, send us your resume, in confidence to:

CW Box 1572
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity Employer M/F/H

Data Processing

TECHNICAL SUPPORT MANAGER

Proven management and technical ability required to manage all activities related to Data Processing Technical Support function of a Virginia based bank holding company. Responsibilities include participation in short term and long range planning, implementation and maintenance of Systems Software, functional guidance and training, and new systems and technology. IBM 370 DOS/VS GRASP Environment with switch to POWER. Banking experience required. Excellent salary and benefits package. Send resume in confidence with salary requirements to:

CW BOX 1574
797 Washington St.
Newton, MA 02160

PROGRAMMER ANALYSTS

We're Looking For Talented Professionals To Grow With Us!

We are a leading manufacturer of industrial and consumer products in need of individuals experienced in RPG 2 computer languege. Qualified applicants must have at least 2 years experience in finance and/or manufacturing systems utilizing Systems 3. An Associates degree or 2 years college in computer science preferred. Duties will entail designing and developing financial or manufacturing applications in a progressive, professional environment. These positions are located in an attractive southern location and offer a competitiva salary and benefits package. Interested individuals should send their resume including salary history to:

CW Box 1571
797 Wasnington St.
Newton, Mass. 02160

An Equal Opportunity Employer (M/F)

Energy Management Systems Programmer Operator

Challanging new position open in sunny Albuquarque to project manage a dual EMS Computar System to be operational in 1979. Responsibilities include approval of manufacturer developed software and herdware documents consistant with contractual guidelinas and project objectivas.

Upon completion of system acceptanca testing and field integration, the Programmer will develop naw power applications programs and other programming techniques, while being responsible for on-going software maintanance.

Applicant should possess a background in, or knowledge of, Electric Utility Power Operation and be experienced in Assembly, Fortran and other computer languages.

If interested, please send resume, salary history and referance to: Plains Electric Generation and Transmission Cooperative, Inc. 2401 Aztec Rd., N.E., Albuquerque, NM 87107.

Plains Electric
Generation & Transmission Cooperetiva, Inc.
an equal opportunity amployer m/f

SYSTEMS ENGINEERS
Computer Specialists, Systems Programmers

A leading mfr. of automated materials hendling systems located in eastern Pe. (one-half hour from the heart of the Pocono Mt. resort area and 80 miles west of New York City) has multiple openings at all levals of systems design and implementation in its expanding Process Controls Dept.

These systems operate on-line end require real-time handling of data end control utilizing large minis end distributed configurations interfacing with remote CRTs, PLCs, microprocessors, OBCRs, other minis, etc.

Require degree in engineering (IE or EE), computer science, mathematics or sciences to work with DEC, DG and IBM minis in Fortran, Assembly and special languages. Nominal travel required. State salary history and requirements. Send resume to Parsonnel Mgr. An Equel Opportunity Employer M/F.

SI HANDLING SYSTEMS, INC.
EASTON PENNSYLVANIA 18042 • (215) 252 7321

SOFTWARE PROFESSIONALS

Systems programming & enelysis. Provide technical support to financial/merketing ereas. Prefer multi-processing PDP-11 bkgd. $18-22,000.

Software Design and Implementation of Telecommunications systems. Develop programs which automete the generation of DB contents/370 environment PL/1. $25,000 plus.

Microprocessors development/implementation of real time multi-tasking operation software for mini-micro computers to $25,000.

Other intermediate end senior positions available NATIONWIDE. To arrange confidentiel interview, call COLLECT (203) 249-9177. Or please send your resume to Joseph Miglizzi, CEC.

availABILITY, INC
750 Mein Street
Hartford, Conn. 06103

FLORIDA

Any equip-Bngk	13-17K
OS/VS IMS Mfg	17-22K
DOS/VS CICS Mfg	14-19K
IMS Data Base Anal	15-19K
Software Special.	18-24K
DOS/VS Fncl Appl	12-15K
Sys Prog MVS	17-20K
Real Time-Mini	12-16K
IMS Proj Ldr	19-24K
Lifa Ins-5yrs exp	15-18K

ROBERT HALF
PERSONNEL AGENCIES, INC.
1311 N. Westshore Blvd.
P.O. Box 22651
Tampa, FL 33622
(813) 876-4191

Administrative Computing Coordinator/ Systems Programmer

Duties: system analysis and design, applications programming, operating system generation, software maintenance, supervision of operations personnel and student programmers. Applicant should have college degrea, experience with college administrative systems (payroll, G/L, financial aid), knowledge of COBOL and other languages, ability to confer with administrative users. Equipment: large DEC RSTS PDP-11/55, IBM-1130. Salary: $12,000 to $15,300 depending on qualifications. Good fringe benefits. Send letter and resume to Thomas Burtnatt, Computer Center Director, Dickinson College, Carlisle, PA 17013 by June 7. Equal Opportunity/Affirmative Action Employer.

LIVE IN OREGON

Immediate openings for programmers/analysts to develop new online systems. Experience desired in FORTRAN, Hewlett-Packard 21MX computers and RTE-III operating system. Opportunity to join growth-orianted company in beautiful small city. Profit sharing and all the other fringes. Send resume to:

APPLIED THEORY ASSOCIATES
180 NW Lewisburg Rd.
Corvallis, OH 97330

JOB ANNOUNCEMENT

EDUCATIONAL SYSTEMS SPECIALIST - A computer professional to serve liaison between the computing canter and the faculty, to serve as a consultant to the academic community, and to implement usage procedure on anticipated new equipment. Desirable qualifications include a Master's Degree in Computer Science, Mathematics, Business, or related field, and experience in computer supported educational research and/or in CAI development. Salary range $14,924 to $19,404.

Apply to Dr. Harold J. Bailey, Chairperson, Search and Screen Committee, Bloomsburg State College, Bloomsburg, PA 17815. Letters of application and resumes must be received by June 16, 1978.

An Equal Opportunity/Affirmative Action Employer.

SOFTWARE CONSULTANT
EASTERN KENTUCKY UNIVERSITY
RICHMOND, KY 40475

Eleven-month appointment as Software Consultant in the Division of Academic Computing Services advising faculty and students, educating University community concerning available computing resources (via seminers end documentation), and designing and modifying software for academic applications. Programming proficiency in at least one high-level language, knowledge of batch processing end job control on e medium or large scala computer, background in applied mathematics or related field required. Master's degree preferred. Facilities include PDP 11/70 time sharing and access to an IBM 370/165 and e DECsystem 10. Position available August 1, 1978. Apply to Carol Teague, Director, Division of Academic Computing Services. An Affirmative Action/ Equal Opportunity Employer.

Due to rapid expension & diversity of new product development, Racal-Vadic, the leading independent manufacturer of low & medium speed modems, offers career challenge to . . .

Field Service Engineers
DATA COMMUNICATIONS
Boston & Chicago Areas

We're looking for self-motiveted, innovetive individuels accustomed to working independently to provide on-site and telephone assistance to customers and applications engineering. You also will provide sales support in trade shows, technical presentations, etc.

Positions require minimum 3 years experience in analog and digital troubleshooting in field service or related repair environment. AA/Electronics or equivalent experience; 1 yeer data communications background preferred. Up to 40% travel.

Racal-Vadic experienced 60% growth last year. We offar competitive saleries end an outstanding benefits peckege which includes quarterly cash profit shering & educational essistence.

Please send resume, including salary requirements, to P. Speers, Personnel Manager, RACAL-VADIC, 222 Caspian Drive, Sunnyvale, CA 94086. (408) 744-0810. An equal opportunity employer.

Racal-Vadic

CAREER OPPORTUNITY

Teledyne CAE, e leader in gas turbina engine development, hes en extre-ordinery career opportunity for en individuel as e Systems Programmer. Experiance in system 370 ALC, opereting system generation and maintenance is desired. Preferably the individual will have background experience with VM/370 or OS/VS1. Salary will be commensurete with experience.

Become a team member developing the most advanced gas turbine engines. We offer an excellent fringe benefit program in addition to compensation. Send detailed resume in confidence to: Mr. Fred D. Reynolds, Manager, Industrial Relations, Teledyne CAE, 1330 Laskey Road, Toledo, Ohio 43612.

TELEDYNE CAE

[illegible]

[illegible]

WORD & INFORMATION PROCESSING
SYSTEMS PROGRAMMERS

A unique IBM 360/370 based distributed logic word processing system with powerful front end microprocessor based dedicated consoles, and IBM compatible trensmission controllers, has been developed for a large scale penetration of the rapidly developing word processing industry.

Our Fortune 500, NYSE company, located in Westchester County seeks systems programmers with knowledge of:

- IBM 360/370 systems.
- Ability to work with IBM/OS, HASP, RJE, Assembler, EXCP, PL/1.
- Design of I-O routines.
- Duties will include systems generation and installation, maintenance and updating of software, etc.
- Experience with micro-processor software helpful.

This is an an outstanding opportunity to be where the action will be in data processing during the 80's "INFORMATION PROCESSING".

For prompt consideration, please forward your resume with salary requirements in confidence to:

dpf
Ms. Anita Buckholz
DPF Incorporated
141 Central Park Avenue
South
Hartsdale, NY 10530

Equal Opportunity Employer

COMPUTER USAGE CONSULTANT

(Whittemore School). Computer consultant to assist the faculty and students at the Whittemore School of Business and Economics. Activities include teaching computer use in non-credit courses, instructing faculty and students in the use of special applications programs and data file management, and locating, obtaining, converting, and maintaining programs of interest to faculty. Qualifications include: B.A. or B.S., three years of consulting or data collection and analysis experience, communication skills, experience in at least two programming languages (BASIC and FORTRAN preferred), and statistical analysis. UNH computer systems include a DEC 10 system with both time sharing and batch capability with emphasis on time sharing. Salary range: $12,180 to $18,924; normally starting salary not to exceed $13,656/yr. Forward resume to Chairman of Computer Consultant Recruiting Committee, McConnell Hall, University of New Hampshire, Durham, NH 03824. Application deadline: May 24, 1978. AA/EOE.

PROGRAMMER/ANALYSTS

Accepting the challenge is your job... Providing the challenge is ours.

Challenging opportunities are available for professional programmer/analysis with at least six months experience we're growing to make room for you

Send resume to

Informatics Inc

1121 San Antonio Road
Palo Alto, CA 94303

Equal opportunity employer

SYSTEMS OPPORTUNITIES

We are an expanding "Fortune 1000" co. seeking:

- PROJECT LEADERS
- SYSTEMS ANALYSTS

Candidates should offer several years of DP experience including Computer Systems analysis & applications design. On-line application & implementation a plus. Top down design experience including project control. Technical background must include strong COBOL experience. You must have good user communication and interface to be used in designing, developing & implementing systems. Excellent salary commensurate with experience.

Send resume in confidence to:

APL CORPORATION

Data Processing Div.
491-A Edward H. Ross Dr.
Elmwood, N.J. 07407
Attn: Data Processing Mgr

equal opportunity employer M/F

PROGRAMMER ANALYST

High visibility position for applications oriented pro. The key is mfg sys. COBOL a must. TOTAL or other data base a plus. Large 370/158 OS installation. $18,500 (Fee Paid) Contact P. Siegal.

ROBERT HALF
PERSONNEL AGENCIES
1310 Liberty Bank Building
Buffalo, N.Y. 14202
716 842 0801

We already know your next employer. May we introduce you?

Wallach Associates, Inc., specializes in bringing together talented, experienced professionals and the nation's leading research, service and technical corporations.

Just one call to Wallach puts you in touch with a wide range of exceptional companies. Companies that offer top salaries, top benefits as well as interview and relocation expenses. All at NO COST TO YOU.

- **Software Design**
- **Data Base Design**
- **Telecommunications**
- **Minicomputer Programming**
- **Signal Processing**
- **Digital Systems**
- **Microprocessor Design**
- **Systems Architecture**
- **Applications Programming**
- **Systems Programming**
- **Compiler Development**
- **Scientific Programming**

If you find your area of expertise listed above, call TODAY! And even if you don't see your technical specialty here, contact us anyway. Chances are we're also looking for people with your qualifications.

Contact Perry Reeder. We'll put you in touch with your next employer fast! Representing equal opportunity employers nationwide (agency)
WALLACH
Your career connection

WALLACH
associates, inc.

1010 Rockville Pike
P O Box 2148
Rockville, Maryland 20852
(301) 762-1100

EDP AUDITOR

The EDP audit staff of one of Indiana's largest and most progressive financial institutions has a position available for an individual with 3-5 years experience in EDP auditing. Ability to program in PL/1, BAL and/or COBOL is a must.

We offer a progressive and challenging auditing environment with constant emphasis on applying the most advanced techniques to meet the needs of sophisticated EDP systems.

Please send resume stating experience, career goals, and salary history to address listed below, or call (317) 266-6793.

Craig S. Sarber

INDIANA NATIONAL BANK

1 Indiana Square Suite 915
Indianapolis, Indiana 46266
An Equal Opportunity Employer M/F

computer hardware and software candidates RELAX

We have scores of openings in all parts of the U.S. Our fees are paid by hiring companies, anxious to find qualified computer hardware and software candidates. Contact the nearest office for confidential service and let us do the footwork.

COMPUTER CAREERS INC.
Specialists-Data Processing
4720 Montgomary Lane
#503
Bethesda, MD 20014
(301) 654-9226

D. BROWN & ASSOCIATES
Dorothy Spiegel-DP Specialist
610 S.W. Alder, Suite 711
Portland, OR 67206
(503) 224-6660

CAREER SPECIALISTS, INC.
4600 El Camino Real
Suite 206
Los Altos, CA 64022
(415) 941-3200

ANDERSON-TAYLOR
P.O. Box 21
Exton, PA 16341
Philadelphia area
(216) 393-1600

SUPERIOR RESOURCES
19400 Ventura Blvd.
Encino (L.A.), CA 91436
(213) 686-4400

LORD & ASSOCIATES
Brenda Sawyer-DP Recruiter
3100 Lorna Rd., Suite 311
Birmingham, AL 35216
(205) 679-1260

members of
National Personnel Associates®
Specializing in DP

FIELD ENGINEER

COMPUTER LEASING COMPANY

Position open in our Fortune 500, NYSE, Westchester based company for 360 and 370 trained field engineer capable of performing physical planning, coordinating installations and discontinuances of 360 and 370 hardware.

For prompt consideration please forward your resume in confidence to:

Ms. Anita Buckholz
Personnel Dir.
DPF Incorporated
141 Central Park Ave. So.
Hartsdale, N.Y. 10530

dpf INCORPORATED

Equal Opportunity Employer

BUY
SELL
SWAP

SYSTEM 34

For Sale. Aug. Delivery

SYSTEM 32

Want to buy. Include; price, model, IBM list price and how long you have had system. Private party, No Brokers Please.

CW Box 1573
797 Washington St.
Newton, MA 02160

USED HP's FOR SALE

21MX's & 2100's
TIMESHARE SYSTEM
7900 & 7905 DISC
TAPE DRIVES
PAPER TAPE
READER & PUNCH

APPLIED SYSTEMS CORP.
6935 Wisconsin Ave.
Bethesda, MD 20015
(301) 951-0122

FOR SALE
NCR 399

10K Memory, Single cassette
Automatic Line Feed
Magnetic Ledger
Contact: Ken Clark
(916) 246-5158
Shasta County
Assessor's Office
Redding, CA 96001

URGENTLY NEEDED! ANY QUANTITY!

DEC and DATA GENERAL

computer equipment

CASH AVAILABLE

CALL TODAY!

(313) 994-3200

NEWMAN COMPUTER EXCHANGE

Know us by our mark

CDA, Computer Dealers Association, is an international nonprofit trade association dedicated to promoting the advantages of used computers. For a membership roster and copy of our code of ethics, write to **Mr. Marvin Lurie, Executive Director, Computer Dealers Association,** 6650 Northwest Highway, Chicago, Illinois 60631 (312) 763-7350

FOR SALE OR LEASE 370/168

(MODEL 1, 3 or A)

AVAILABLE JUNE '78
Bob VanHellemont
CMI CORPORATION — (313) 642-8000

FOR SALE

INTEL 7745 768 K

ITC QUALIFIED AVAILABLE 8-15-78
CALL PAT MILTON
214/630-6700

LEASING?

WE'VE GOT YOUR 303X ON ORDER
...plus 135, 138, 145, 148, 158 & 168's too
(over $130 million worth!)

- We'll write a short-term or long-term lease — on YOUR system or OURS
- We'll configure a total system or part of one to your specifications

Our leasing concepts are sensitive to your needs

COMPUTER CAPITAL CORPORATION

1351 WASHINGTON BLVD STAMFORD CT 06902
203-357-9663

DEC

HARDWARE
PDP11-PDP8
LSI-11's
Processors Peripherals
Memories
VT52's LA36's
LS120's LA180's
Also available
Other printers and discs
available with controllers
for most minicomputers.

NDS
NATIONAL DATA
SALES CORP
516/944-7444

WANTED

BURROUGHS 'L' Series
DEC & DATA GENERAL
Minis & Peripherals
NCR: 399 & 299

Boynton Business Systems
87 Route 208
Wallkill, N.Y. 12584
914-895-2007

DEC HARDWARE

PDP 11 PDP 8
Processors Peripherals
Memories
VT52's, LA36's, LS120's, LA180's
BROOKVALE ASSOCIATES
Seekers and Sellers
(516) 585-0800

Why Comdisco is First in the Second Market:

IBM Processors available

145/148 Sale or lease Immediately avail.	155/158 Machines available now Sale • Lease • Trade	165/168 Lease machines interim to your 3033	3032/3033 Avail. 4th Qtr. Lease only

IBM Peripherals available

3420 We will purchase your 1600 BPI drives and replace with Models 4 or 6 immediately	3830-2 3330-33 3340-A2,B2 Sale or Lease	3420-5 With #6631 available now Sale — Lease	3350 Want to buy P.O. credit machines

IBM 3031, 3032, 3033 operating leases available.

Atlanta 404/256-5956
Fort Worth 817/534-1774
Minneapolis 612/854-8107

COMDISCO

New York 201/568-9666
San Francisco 415/944-1111
Paris, France 374-1130

9701 W. Higgins Rd., Rosemont, Ill. 60018 (312) 698-3000

Your First Choice in the Second Market

WANTED

ALL 360/370 SYSTEMS AND SYSTEM/3
AND PERIPHERALS
WE BUY • SELL • LEASE • TRADE

transdata

P.O. Box 47762 Dallas, Texas 75247 PHONE (214) 631-5647

BUY SELL LEASE

370, 360, 1401 & 1440
SYSTEMS & PERIPHERALS

PURCHASE/LEASEBACK

029, 129, 3741, 3742, 3540,
3803, 3420, 3340's

IBM UNIT RECORD
EQUIPMENT

026, 082, 083, 084, 085, 087, 088,
402, 407, 514, 519, 548, 552, 557,
029-059-129

Call us for all your needs, we buy rent and sell all types of IBM unit record equipment. Over 12 years of serving commercial and government requirements. Contact ACS for proposal

ACS
7126 Mullins
Houston TX 77081
(713) 666-2122
TWX 910-881-1526
EQUIPMENT CORP.

370/165-II

- FOR SALE OR LEASE
- AVAILABLE JUNE 1978
- AS SHORT AS 24 MONTH LEASE AVAIL

CALL TED MOLINARI AT:
(201) 947-4200

IPS
IPS COMPUTER MARKETING CORP
2460 LeMoine Avenue
Fort Lee N J 07024

TIGER COMPUTER
415 MADISON AVENUE
NEW YORK, NEW YORK 10017
(212) 532-1500

A TIGER INTERNATIONAL
COMPANY

SHORT AND LONG TERM
STRAIGHT WALK-AWAY LEASES
THAT'S RIGHT!

[illegible]

370/138, 148, 135, 145, 125
370/158's 168's and Peripherals
IBM Series-3031-3032-3033

WE BUY SELL & SUBLEASE
ALL IBM 370 CPU's & I/O

303X Leasing

Large industrial corporation wishes to purchase and lease back to substantial corporations IBM 303X Systems. We will only deal with end users and equipment must be scheduled for delivery in 1978.

CW Box 1410
797 Washington St.
Newton, Mass. 02160

For Sale Or Lease

System 3/15

Complete Systems

- SHORT OR LONG TERM
- CONFIGURED TO YOUR NEEDS
- WITH OR WITHOUT PERIPHERALS

Any configuration from B19 to D24
30 to 90 days delivery
Also complete inventory tapes — disks
Printers — CPU Upgrades

CDB FINANCIAL, INC.

3131 MAPLE AVE. • 15B DALLAS, TEXAS 75201
214-745-1749

CMI BUY LINES

BUY-SELL-LEASE-TRADE

Call (313) 642-8000

3031/3032/3033
3031 Delivery 12/78
Marilyn Burchi

370/165 370/168
168 Available June '78
(2) Available July '78

370/158
Ron Baker

370/155
(1) Available Now!

370
148/145/138/135
(4) Available now to June

370/115/125
Call for Details

3420 3803
3333 3830
3330 3340
Darryl Hastings

1403 2821
2501 1442
1443
Joe Romeo

360
30/40/50/65
Best of Values

3270 CRT's
Printers/Controllers
1130
Jim Carleton

System/3
Model 15
Jerry Roberts

3742
3741
5496
Patti Lamia

360/20
085-083-029-059-026-129
Marie Bednarz

BUY OF THE WEEK

370/168
SN 60306
June availability. Will configure to your requirements.

370/155J
DAT • 3 Channels
1 Meg IBM • 3215 Console
Available Now! $575,000
Gary Smith

135 1
S/N 61027
All IBM Memory
IFA, IPA, ICA
Available April.

360/20
All Models
Immediate Delivery
Purchase/Lease Plans Available
Call
Marie Bednarz

IBM 158
Memory I to KJ
Available April.

Call (313) 642-8000

CMI CORPORATION *The IBM Specialists*
1500 N Woodward Ave Birmingham, Mich 48011, (313) 642-8000

IN CANADA CALL:

Don DuPule
Windsor, Ont
(519) 258-8910

Ron Ridding
Toronto, Ont
(416) 683-3704

Jacques Oegenele
Montreal, Que.
(514) 374-5920

★

NEW DG NOVA 3/12's

WITH BATTERY BACKUP AND AUTO PROGRAM LOAD AND RESTART
NEW DG MEMORY
32 OR 16 KB

IMMEDIATE DELIVERY WITH 22% DISCOUNT!

CALL CLARK & ASSOC.
(816) 741-3183

BUY SELL LEASE

SYSTEM/3

Models 15, 10, 8, 6
Systems 32 & 34
All Support Peripherals

COMPUTER BROKERS, INC.
P.O. BOX 28298
Memphis, Tn. 38128
Phone 901/372-2622
Member CDA

FOR LEASE
370/145 Interim to 3031
370/145
Available June, 1978
(# 10597)
3031
(P.O. # 526180)
Available August, 1979
Call Anne Rhame
(804) 643-9123

CCA COMMONWEALTH COMPUTER ADVISERS, INC.

158

IPS

201-947-4200

New PDP-11/70 Available Now

Caused by change in corporate plans. Complete system with just-signed DEC maintenance agreement. Includes:

- Floating point
- 10-1/2 in. expender box
- System Unit
- 8 port MUX
- Cabinet
- RP05 88MB drive & cont.
- 1600/800 bpi tape & cont.

Ask for Joe Letbetter

Telefile COMPUTER PRODUCTS, INC.
17131 Daimler St.
Irvine, CA 92714
(714) 557-6660

MINICOMPUTERS & SYSTEMS

Don't waste company time or money. Check with us before you buy or sell.

New DEC Equipment
Immediate Delivery

RK11-RK05 Disk Systems - $8500
PDP 11/04s and 11/34s - 20% off list
DZ 11
DEC Station 78

New DG Equipment
Immediate Delivery

DG 10 Mbyte Disk Systems from $7500
DASHERS - 15% to 25% off list
Nova 3/12 or 3D - 20% off list

Immediate delivery for MOS!
Inventory Clearance
call us for free brochure

MINICOMPUTER EXCHANGE
(408) 733-4400
TWX 910-339-9272

BUYING

N.C.R. 270-299-399-775
31, 32, 41, ETC.
BURROUGHS "L" SERIES,
B700, B1700
I.B.M. 129-029-Systems 32/34

SELLING

129's-029's-059's
Immediate delivery
Also: 026-056-082-083-084
085-088-402-403-407-514
519-548-552-557
Eligible For IBM M/A

WILLIAM MARION COMPANY, INC.
P.O. BOX 309/HACKENSACK, N.J. 07602

FOR MORE INFORMATION [illegible] 34[illegible] -554

3340 B2

3350 A2 A2F B2 B2F

Large quantities available now.

3830-2 Control units also available

Sale or lease

Call Bob Bardagy
COMDISCO (312) 698-3000
[illegible] nearest COMDISCO [illegible]

COMDISCO

LIQUID COOLED MAIN FRAME USERS

We have a cooling unit for liquid cooled CPU's that operates up to 50% cheaper than other available units. Saves installation time and money. Does not take up space in computer room. Comes complete with 100% back-up system.

CONTROLLED ENVIRONMENT CORP.

840 Reynolds
Kansas City, KS 66101
(913) 342-3599

Over ten years experience in computer room environments. Ask about a heat recovery system for your EDP site. Could save you a small fortune in utilities.

Available

- *CSA is the principal*
- *Short Term Leases Available*
- *Delivery & Installation Guaranteed*
- *Under Secured Documentation*
- *Configured To Your Needs*

Call Marv Berger at 800-225-2036

135
GF • I • DH • I • FE

3830-2
2150, 2151, 6111, 8170

145
H J

135
FEATURES

370
PERIPHERALS

CSA
Computer Systems Of America Inc.
141 Milk Street
Boston, Ma 02109
(617) 482-4631

CSA is a private lessor and lease underwriter with a portfolio over $300 million plus of computers under lease to the world's leading corporations.

Before you buy or sell used computer equipment consult

COMPUTER PRICE GUIDE

"The Blue Book of Used Computers"

Quarterly publication contains current price information about used IBM computers and peripherals. Includes newsletter about current price trends and availabilities.

$5 per issue — $18 annual subscription

Computer Merchants Inc
75 South Greeley Avenue Chappaqua New York 10514
Member Computer Dealers Association (914) 238 9631

BUY SELL LEASE
BROKERAGE

[illegible] IBM 360 370 System 3 [illegible]

COMPUTER INTERNATIONAL LTD
BEACH COMPUTER CORP
[illegible] Leasing Division
COMPUTER WHOLESALE CORP
(504) 581 7741

Suite 507 508 First National
Bank of Commerce Bldg
New Orleans LA 70112

SALE

ALL
IBM Unit Record
Equipment

129 & 029's

East Coast (717) 564-8870

West Coast (415) 332-6265
(714) 754-7823

dpa Unit Record Leasing Company
110 HiVista Road
Sausalito, Calif

LEASE

---

370 CPUs System Memory
115-138
Steve Lacny

370 CPUs Memory
145-148
Jim Myers

360 **Memory**
M J Dorsey

CPUs Peripherals
360
Neal Johnson

Returning Equipment to IBM?

Before you send any of the following machines back to IBM, call us. We'll show you how to make money using your rental credits.

CPUs	Disk	Tape	110
3115	3330	3410	1442
3125	3340	3411	2501
3138	3344	3420	2821
3148	3350	3803	3505
5415	3830		3525

CPUs Peripherals Memory
Sys/3
Models 6-15

System
32-34
Mary Cronan

Tape Disk I/O
370 **Peripherals**
Tom Anderson

3741-42
Becky Ernst

dataserv

Call Toll Free 800-328-2406
or 612-544-0335

Or write: Dataserv Equipment, Inc., 9901 Wayzata Blvd.
P.O. Box 9488, Minneapolis MN 55440

buy • sell • lease • trade

2314-B1

- Up to 9 SPINDLES
- 60 m.s average access time
- Two channel switches available
- Immediate delivery — Sale or Lease

COMDISCO
312-698-3000

BUY • SELL • LEASE

029	$ 850	095	$ 750
029	1850	088	2500
059	1375	129	3350
082	800	514	800
083	1800	549	1500
084	2500	552	900
		557	2800

MOHAWK-6401-9403 NCR-739

Want to buy IBM 029's 129's 3741's 3742's

COMPLETE LINE BURSTERS SHREDDERS
DECOLLATORS AND BINDERS
ECONOMICAL LEASE PURCHASE PLANS

CALL **DP SERVICE INC.**
STAN PELC or NATALIE REYES
312-774-2556
5505 N MENARD AVENUE CHICAGO ILLINOIS 60630

BSI

BURROUGHS
LEASE - PURCHASE

Peripherals
B9486-4 Disk Pack Drives
174.4 MB
B8393-1 Magnetic Tape Drives
144KB 1600 BPI
B1726's & B1860

Complete Systems - No problem on Maintenance Agreement.

B4700
Complete System - No problem on Maintenance Agreement.
SOLD

Assorted Selection of TC700's, Series L, B700's.

Lawrence G. Lyon
2480 W. Alameda Ave.
Denver, Colo. 80223
(303) 922-8331
If You Need It
We'll Find It

---

efm computer
leasing, inc.

3000 marcus avenue
lake success, ny 11040
(516) 488-7876

LEASE • BUY • SELL

360/370 CPUs & PERIF.

ATTRACTIVE LEASES ON

360/40 360/65
360/50 370/135
370/145

PIONEERS IN THE USED COMPUTER INDUSTRY

BUY SELL

[illegible] 017 085
[illegible] 087 403
088 407 523
402 548 604

DATA
AUTOMATION
COMPANY
INC.

402 514 552 026
519 557 029 083
602 056 084 089
029 129

TRADE

MAJOR DEALER IN USED COMPUTERS

ALL SYSTEMS & PERIPHERALS

IF YOU ARE RETURNING RENTAL CREDIT EQUIPMENT TO IBM WE CAN SAVE YOU FREIGHT AND MAKE YOU MONEY!

The Professionals

IPS 201-947-4200

FOR SALE OR LEASE

165K-II
4 megabytes with DAT and channel

158K
With ISC available on 2 year lease

155J-II
up to 2 megabytes with DAT

145
Model 2 CPU any core size w/ or w/o ISC

135-I
Will sell or lease as an H. Has full feature complement

4 MB IBM 168 MEMORY
Available 7/15/78

125-H
1403 Pr. Byte Mpx MTA Avail 7/1/78

65-I
up to 2 megabytes and/or 6 channels

3420-X
Most models readily available with controllers

WANTED TO BUY
168, 158, 148 & 138's
165, 155, 145, & 135's
All 370 peripherals
CRT's & controllers

IPS [illegible]

3742-1

FOR SALE OR LEASE

AVAILABLE NOW

INTERCAP
214/387-2652

CHRIS ANGULO

WANT TO BUY
- IBM 3240 Tape Drives & Controllers
- IBM 370/138 J-IFA
- IBM 3211/3811 Printer
- IBM 3330/3333 Model 1 and 11
- IBM 3277 CRT's and Controllers
- IBM 3350 A2F & B2F
- IBM 3340/B2

FOR SALE OR LEASE
- IBM 2365/2 Memory
- IBM 3420/3 & 5 Tape Drives
- IBM 2540 Read/Punch
- IBM 3330 DASD
- IBM 2880/1 Selector Channel
- IBM 3277 CRT's and Controllers
- IBM 3830/2-Full Medrids
- IPC 6780 Block MPX Channel

Call

FORSYTHE McARTHUR
(312) 943 37[illegible]

Dealer & Lessor in IBM Computers

Forsythe/McArthur Assoc.
815 N. Michigan Ave.
Chicago, Ill. 60611

Member Computer Dealers Association

PDP11/40 RSTS/E SYSTEM

1 DS535-DA PDP11/40 192KB
3 RK05-CA Disk Drives & Controller
1 LP11-VA 132 Column Printer
1 DH11-AD 16-Line Mux with Modem control
1 H967-DH Mounting Cabinet
1 VT52 CRT Terminal
1 LA36 Console Terminal
1 CTS/E (RSTS/E) License

Price $35,000

The system has been under e continuous DEC maintenance contract. Please contact Ron Truxton or Tom Griffiths at:

Evans Griffiths & Hart, Inc.
(617) 861-0670

BROKER IN DEC COMPUTER SYSTEMS AND COMPONENTS

C.D. SMITH
730 N. Post Oek Road
301
Houston, Texas 77024
(713) 686-9405

IBM 3032

AVAILABLE
Jan 1, 1979

Contact: Jerry Borisy

JBI ASSOCIATES, INC.
445 Union Blvd., Suite 303
Lakewood, CO 80228
(303) 988-0820

CONTINENTAL Information Systems

BUY, SELL, LEASE, SUBLEASE, AND TRADE

NEW AND PRE-OWNED IBM EQUIPMENT

AVAILABLE

168 KJ - 8 Channel - May
165 K - DAT available - May/June.
158 J - 2 Megs OEM - May
158 AP - new - June
155 J2 - June
145 I2 - May
135 - 384K - May

WE ALSO HAVE NEW, ITC QUALIFYING 168, 158, 148, and 138 IN APRIL - MAY

Peripherals and I/O

All 360/370 Disk, Tape Printers, Readers, and T/P

Gene Chappell

Wanted:
3330's, 3340's & 3420's

Call Us!

CIS

CIS Corp
600 MONY Plaza
Syracuse. NY 13202

315-425-1900

CIS is very interested in buying pre-owned IBM 370 systems. If you are thinking about selling, let us make you an offer.

DEC

FOR SALE

RK05J New-$3200
RK11J New-$7000
RP03
Dive Disk (160MB)
TMB11-EA
MG10 (256KB)
DH11AD, AE
LA180 New-$2,175
DF10, RP10, RP03
Deta System 310

Western Data Systems

P O Box 7000 182
Redondo Beach, CA 90277
(213) 377 1414

IBM 360-501

AVAILABLE FOR SHARING

(WALL ST AREA)

3 SEL. CH.
12 2314
8 2401-3
3 1403-N1
2 2501
1 2540-RP

CONTACT: FRANK SAHANAS
(212) 344-2300 X 275

LEASING

3031, 2, 3
yours or ours
370/138 thru 370/168

WANT TO BUY

370/158 370/168
Any 370 Peripherels

Computer Resources, Inc.
511 Phoenix St.
P.O. Box 527
South Heven, MI
(616) 637-8425

SHORT OR LONG TERM LEASES FROM

dpf

360 SERIES
LEASE A 360 TODAY!

If You Outgrow It DPF Will Provide A Larger 360 or 370 To Meet Your Requirements

Available July 360/65
Available August 360/50

DPF Provides A Full Range Of IBM Systems
From 30's .... to 168's

Call: Jack Dugan (914) 428-5000
DPF Incorporated
141 Central Park Ave. So.
Hartsdale, N.Y. 10530

FOR SALE System 3

Model 15D
192K, 3340, 1403
Available immediately
Call: E. Salle
(312) 977-7401

FOR SALE

IBM 1060
Teller Terminals end

IBM 2980
Teller Terminals
with 2972-8 Controllers

Available May 1, 1978

For further information call

Mr. John Maher
(212).584-6000 Ext. 332

PDP 11/45 FOR SALE

RF-RS
2-RP03
2-TU10
256 KB + CACHE
1800 LPM Printer

3 years under DEC maintenance

COMPUTER RESOURCES

(303) 771-6630
5660 South Syracuse Cr.
Englewood, CO 80110

WAITING FOR YOUR 303X?

Datronic is offering your company tremendous savings on purchese - leesebacks of your presently installed 138 or 148 computer system.

Call Will Foss Collect Today!
(312) 992-0760
or write in confidence:

DATRONIC RENTAL CORPORATION
5210 Wasley Terrace
Chicago, Illinois 60656

CALCOMP

For competitive, flexible lease terms on your installed or on-order (or our on-order) 370 or 303X CPU or complete system, call Jack Hughes today!

CALCOMP FINANCIAL, INC.

2411 W. LaPalme Ave., MS 28
Anaheim, CA 92801
(714) 821-2785

America's Leading Companies Depend on us.

Buying · Selling · Leasing
Purchase/Leaseback

3277 3803 3286
3272 3420 3284
3340 3330 3830

Contact Bob Haggerty 203 438 9567 or Charles Pratt 214 361 8337
R. K. Enterprises, Inc.

Short-Term Lease:

370/158

Model JI KJ U34
Serial 23104 23560 23761

An ideal interim solution for users who require more processing power while waiting for their 303X. Available immediately from CSA on very attractive short-term lease basis.

Call Marilyn Glazer at 1-800-225-2036

CSA
ComputerSystemsOfAmericaInc.
141 Milk Street, Boston, Ma 02109
(617) 482-4671

CSA is a private lessor and lease underwriter with a portfolio of $300 million-plus of computers under lease to the world's largest corporations.

BEFORE YOU BUY, SELL, OR LEASE, TAKE A 'SECOND' LOOK!

FOR SALE

3145-H02 with 4660 and 6982
Plus 256K Add-on AMS memory
Available 8/78
3155-J with DAT Box—Delivery 7/78
3158-K—Delivery 8/78
3158-U34—Delivery 8/78
3031 Lease—Delivery 10/78
Sub-lease for 18 months:
Ten 3420-7 with 3803-1

WANT TO BUY

3145-J2—Inst. 7/78
1442-N2 3830-2
2821-1 2880-2

COMPUTER INDUSTRIES INC.

3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654

CHICAGO 312 298 5650
WASHINGTON 703 525 3074
LOS ANGELES 213 370 4844

---

168 IPS

201-947-4200

IBM 370/158
Attached Processor System
AVAILABLE
JULY, 1978
Contact: Jerry Borisy
JBI ASSOCIATES, INC.
445 Union Blvd., Suite 303
Lakewood, CO 80228
(303) 988-0820

BUY • SELL
TELETYPE
MODELS
43 • 33 • 32

NATIONAL
TELETYPEWRITER CORP
207 Newtown Rd
Plainview, N.Y. 11803
(516) 293 0444

PROFESSIONAL DEALER/LESSOR OF IBM COMPUTER SYSTEMS

Bob Russell
Jack Emery
Dave Hepburn
Paul Baillie

SYSTEMS MARKETING INC
200 E. Thomas Road
Phoenix, Arizona 85012
(602) 264 5600 Telex 667 334

SMI

FOR SALE

19 ea. IBM 3277-1
Terminals
2 ea. IBM 3275-1
Terminals
1 ea. IBM 3271-2
Control Units
Write or call for information
Property Redistribution
University of Utah
Salt Lake City, Utah 84112
801-581-7917

FOR LEASE

370/158-2 megabytes system with/ISC
370/168-4 megabytes system with/ISC

Contact
T.J. McArdle

TIGER COMPUTER
415 Madison Avenue

N.Y.C., NY
(212) 532-1500

BUY-SELL TRADE

For Computer
Call Action Write

CAC

404/458-4425
P.O. Box 80572
Atlanta, Ga 30366

LEASE ONLY - LARGE SCALE IBM SYSTEMS

DATES AVAILABLE

3031's	11/78, 5/79, 6/79 11/79, 5/80
3033's	6/79, 9/79, 12/79

SHORT TERM LEASES

3168 LK	6/78
3168 M	11/78

For details, call R. Weissblatt-216/351-7444

ATTENTION HONEYWELL USERS!

66/20 For Lease—Complete System
196K Word Central Processor, including
Front-end Communication Processor
HIS RENTAL $23,000/month
TCP RENTAL$ 7,000/month
64/20, 64K, Full I/O, Comm., Avail. Immed.

For details, call Larry Donat-216/351-7444

The Computer Place.
4650 Spring Road
Brooklyn Heights, Ohio 44131
(216) 351-7444
A Division of D&D Financial Enterprises, Inc.

FOR SALE

3275-2 Display Stations
3286-3 Printers
3284-3 Printers
50-70 Available Now-November
3350 B2F Disk Storage
3 Available June 1
Call or Write

(714) 833-9800
TWX 910-595-2550

SADDLEBACK MARKETING CORP

1401 Dove Street, Suite 245
Newport Beach, CA 92660

$100

DECwriter II approved MODULE REPAIR

Any repairable LA-36 logic board, power board, printhead, or servo motor.

$100

Contact: Don Christy

management response corporation
660 busse highway
park ridge, illinois 60068
(312) 698-3377
outside illinois dial
toll free 800-323-2135

DEC PROCESSORS

PERIPHERALS & MODULES

BUY - SELL - LEASE - RENT

$1,000,000

NEW & USED DEC INVENTORY

- —DEC CPU'S
- —DEC DISKS & CONTROLLERS
- —DEC TAPES
- —DEC TERMINALS
- —DEC PERIPHERALS
- —MISC. BOARDS & MEMORY

Hundreds of Misc. Modules & Cables Available
Call for other components in stock

NEW [illegible]05J's
Sold Out
[illegible],900.00

For fast delivery and substantial $aving$
CALL the DATALEASE Digital HOTLINE
800-854-0359

DATALEASE

700 No. Valley St., Ste. A, Anaheim, Calif. 92801
714) 533-3920 Telex 692439

When you plan to buy or sell your computer equipment...

For complete information call the Greyhound Representative in your area.

WANT TO BUY

370/158 370/155 370/145

US	Home Office	T A Takash	602-248-6037
	New York	Dick Ventola	914-949-1515
	Chicago	Pete Ahern	312-298-3910
	Dallas	M W Bill Tucker	214-233-1818
	San Francisco	Henry Paulson	415-283-8980
INTERNATIONAL	Canada	Don Maunder	416-366-1513
	U K Europe	Joe Gold	022-61-27-54
	Mexico	Andres Contreras	905-543-6850
	Austro-Asia	John Hallmark	214-233-1818
	Eurasia	Don Haworth	214-233-1818
NON IBM	Dallas	John Hallmark	214-233-1818

GO GREYHOUND

Greyhound Computer Corporation
Greyhound Tower Phoenix Arizona 85077

WANTED TO BUY

370/155 ANY CONFIGURATION

DAT ORDER POSITION FOR 155

FOR SALE OR LEASE

Available Now

370/155 MEMORY
2½ MEGABYTES

COMPUTER INSTALLATIONS CORPORATION
5514 Caroline Street
Houston, Texas 77004
713-524-8249

Please Contact:
Harry Blair
or
Richard Johnson

370/125's

For Sale* Lease* Purchase
****Purchase Leaseback***

Specialists in 125 Systems
3410's and 3411's Also Available

CORPORATE COMPUTERS, INC.
(203) 661-1500
115 Mason St., Greenwich, CT 06830
Member CDLA

FOR SALE OR LEASE

370/155 II K

FIVE CHANNELS
Available July 1, 1978
Contact Hal Begzos
214/630-6700

PCM
Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247

FOR SALE

Diva Inc. DD-32 Disk System, 232MB Cap. Calcomp 1 Cab., 2 Spindle. Control by Diva/Interdata for PDP-11/45. RP03 Emulation. W/6 Packs. Must sell. Asking $12K. Attn. to any Reasonable Offer.

John Muller or Terry Monaghan
Zipatone Inc., 150 Fencl Ln, Hillside IL 60162
(312) 449-5500 9AM-5PM

FOR SALE

IBM System 32
13.7 mb disk
24k
1551pm printer
Available Immediately
$32,500
fob Farmington, NM
Olman Heath Co.
505-325-4508

WANTED

NCR

299, 399 & 499s

Smith-Anderson Corp.

714-346-3227

Top dollar paid for west coast machines

DEC10/DC10

Data Line
Scanner
FOR SALE

(617) 262-2300
J.C. Smith (3903)
The First Church of Christ, Scientist

WANT TO BUY

256K Memory for 360/50 Model H
(from 256K to 512K)
PRINCIPAL AND USERS ONLY

CUMMINS-ALLISON CORPORATION
1825 Glenview Road
Glenview, IL 60025
Attn: Ed Mrowiec

SALE

IBM 1419 MICR
4-Reader Sorters
Single Address
Multiple Column Control
Excellent Condition
Under Full
IBM Maintenance
Available
2-July 2-August

CALL
METROPOLITAN COMPUTER CENTER
Naperville, ILL 60540
(312) 355-3772

SEVCO

Mini-Computer Brokers

DEC SPECIALS

11/45 64KB

11/34-DM to 256KB

RK05=AA

MS11-JP

DL11-A-B-C-D-E-W

Spare Processor Boards
Immediate Delivery

SEVCO, INC.
22 Karal Drive
Framingham, MA 01701

Short-Term Lease:

370/165 *with/without DAT*

Model	*KJ*	*K*
Serial	*60103*	*60205*

An ideal interim solution for users who require more processing power while waiting for their 303X. Available from CSA on very attractive short-term lease basis.

Call Marilyn Glazer at 1-800-225-2036

CSA
Computer Systems Of America Inc.
141 Milk Street, Boston, Ma 02109
(617) 482-4671

CSA is a private lessor and lease underwriter with a portfolio of $300 million-plus of computers under lease to the world's largest corporations.

SALE OR LEASE

370/138

AVAIL: 6/1/78

$6400. P/Mo.

215 635 1700
Computer Marketing Inc.
7704 Seminole Ave
Melrose Park Pa
19126

Member Computer Dealers Assn

Available For Sub-Lease

370/148

Randolph Computer Co.

800 243-5307 (Conn) 661-4200

BUY SELL

Surplus DEC And Data General Hardware

For Sale

PHIL THOMAS (305) 272-8753

Thomas Business Systems, Inc.

3420-5 Tape drives

Immediately available

SALE OR LEASE

Call Bob Bardagy
COMDISCO (312)698-3000
(nearest COMDISCO office)

COMDISCO

IBM UNIT RECORD EQUIPMENT

MACH	SALE	LEASE	MACH	SALE	LEASE	MACH	SALE	LEASE
024	$ 200	$20/Mo	059	$1400	$50/Mo	129	$3400	$110/MO
026	$ 800	$30/Mo	082	$ 800	$30/Mo	514	$ 500	$ 45/Mo
029	$1500	$55/Mo	083	$1700	$60/Mo	519	$1000	$ 55/Mo
046	$ 800	$40/Mo	084	$2500	$90/Mo	528	$1200	$ 50/Mo
047	$1400	$60/Mo	085	$1200	$80/Mo	548	$1500	$ 80/Mo
056	$ 200	$15/Mo	088	$2500	$150/Mo	557	$2000	$100/Mo

Sale: 360/20 system: $9500. WANTED TO BUY: 2741 - $3500
2742 - $5200
029- and -129.

THOMAS COMPUTER CORPORATION
600 N. McClure Court - Suite 4202
Chicago, Illinois 60611
(312) 944-1401

HONEYWELL 2040 FOR SALE

AVAILABLE 3/79
Call or Write:
K.S. Rand
P.O. Box 1848
Wilson, NC 27893
(919) 237-5251

WANT TO BUY

BURROUGHS L8200, L8300

WITH/WITHOUT
CASSETTE DRIVE
DAVE CRAWSHAW
SOURCE ONE, INC.
(616) 375-8860

FOR SALE UNIVAC

70/246 Printer
With Controller
And 2 Print Chains
Available Immediately

CALL D.O. O'NEAL
(904) 396-2011

ISI

INDEPENDENT HONEYWELL DEALER

INTEGRITY SYSTEMS, INC./CALL: WILSON GRABILL (513)-874-8100

HONEYWELL
INCOTERM ·
Intelligent Terminals

Hardware
Software
Turnkey Application Packages
- Payroll
- A/R
- A/P
- G/L
- Inventory

Industry Packages
- Distribution
- Construction

Top Processing Power at Minimum Cost
- Stand-Alone
- Remote Batch
- On Line

Priced from $18K purchase or $400 per month lease for complete package.

HONEYWELL
LEVEL 6

Minicomputers
- 32K to 2 Meg memory
- Disk – .5 Meg to 2.4 billion
- Total peripheral line

Software
- Cobol • Fortran • Basic
- Transaction oriented operating system
- Data base management

Application Packages
- All accounting functions
- Distribution & Construction

Check Our Low Prices
- Mix & match peripherals
- Dealer discounts

HONEYWELL
USED SERIES 200/2000

We buy disk & memory.
We broker systems.
We sell parts & peripherals.
We repair & upgrade systems.
Systems prices have never been lower. Now is the time to purchase a spare system for backup or parts.

ISI

INTEGRITY SYSTEMS, INC.
4812 Interstate Drive • Cincinnati, Ohio 45246

AVAILABLE FOR SUBLEASE

IBM 158-J
Available 11/1/78
Additional Memory Available
Sublease for 1 - 3 Years
IBM 3830 ALSO AVAILABLE
Western Marketing
and Financial
(415) 526-9221
(312) 397-3311
Jack Air Fred Hegeman

WANTED TO BUY

IBM 370/125 IBM 370/135

Send price,
configuration and
delivery date to:

Burleigh-Knott, Inc.
P.O. Box 3141
Lafayette, LA 70502

FOR SALE NCR 399

10K Memory, Singla cassette
Automatic Line Feed
Magnetic Ledger
Contact: Ken Clark
(916) 246-5158
Shasta County
Assessor's Office
Redding, CA 96001

PDP-8E, 11/04, 11/34, 11/35, 11/45, VT50, VT52, VT71, VT61/t, RP04, RP05, RP06, RK05, RK06, RX01, 11/04, PRS01, LA36, LA 180, MF11U, MM8E, 11/34, 11/35, 11/35, 11/45, VT50, VT52, VT61/t, VT71, RP04, RP05, RP05 PDP-8E, 11/04, 11/34, 11/35, 11/45, VT50, VT52, VT61/t, VT71, RP04, RP05, RP06, RK05, RK06, RX01,

digital

Now you can get factory refurbished equipment for the same price as used.

If you've been looking for a bargain, we've got the bargains you've been looking for:
- Complete systems
- Processors
- Peripherals
- Accessories

All Digital equipment. All with complete documentation. All quality tested and warranteed by the people who made them.

To find out how much you can save, call toll-free* any time between 9:00 a.m. and 5:00 p.m. EST 800-258-1728. *(New Hampshire residents call 603-884-5736.) Or clip the coupon and send it to Digital Equipment Corporation, Traditional Products Group, 125 Northeastern Boulevard, Nashua, New Hampshire 03060.

Digital Equipment Corporation,
Traditional Products,
125 Northeastern Boulevard,
Nashua, New Hampshire 03060.

☐ Please send me more information.
☐ Please call, I'm specifically interested in:

Name ________
Title ________
Company ________
Address ________
City ______ State ______ Zip ______
Phone ________

CW5228

BUY • SELL • LEASE • TRADE

SYSTEM/3 370/115 370/125

ECONOCOM

ECONOCOM
1255 LYNNFIELD ROAD
P O BOX 17825
MEMPHIS, TENNESSEE 38117
901-767-9130

MEMBER COMPUTER DEALERS ASSOCIATION

3031

For Lease 5 to 7 Yrs.
Nov. 17, 1978 Ship

CCI
Computer Concepts, Inc.
6443 S W Beaverton Hwy
Portland Oregon 97221
(503) 297 4721

FOR SALE
OR LEASE
Burroughs B-4700 System
8 I/O Channel 150K CPU, Card Reader, Card Punch, Line Printer, 4 Tape Cluster. 80 million characters of head per track disk.
Contact: B. Hogan
Dresser
Industries, Inc.,
1505 Elm St
Dallas, Texas 75201
(214) 745-8809

FASTBALL
A Cobol source program generator
New programs in minutes
Over 100 installations
ANS source code included
Modestly priced - Free trial
ABC Data Services
919 Cherry Street
Grand Rapids, Michigan 49506
(616) 774-0011

DATA services

BUY · SELL · LEASE 370 SYSTEMS

Want To Buy
Any Memory Size
370/135 370/145 370/158

CALL DICK FEEHAN (201)569-3838

DCL *Marketing, Inc.*
An Affiliate of Diebold Computer Leasing, Inc
177 NORTH DEAN ST • ENGLEWOOD, NEW JERSEY 07631

CENTRON

Computer Corporation
The THINKing person's alternative . . .
BUY • SELL • LEASE
IBM Computer Equipment
360/370/30XX and Peripherals
Call us for current availability and pricing
612/884-3366
8120 Penn Avenue South • Minneapolis, Minnesota 55431

buy sell swap | software for sale | software for sale | software for sale | time & services

3800
Print Time
For Lease

Call Ken Soffe

213 265-5824

FOR SALE

370/155-J S/N #010206 with features #1433, 7855, 3215-1 and DAT, 2 Megabytes Cambridge Memory.

Available May 19, 1978

EVERGREEN COMPUTER & FINANCIAL, INC.

One Appletree Square, Suite 251
Bloomington, MN 55420
Phone: (612) 854-2000

SOFTWARE

FOR

SALE

MEDICAL/DENTAL BILLING

Complete Billing and Insurence Processing for doctors, groups and clinics.

- Complete Insurance Forms
- Profile, RVS, ICDA Files
- Bal. Forward, Ledger
- COBOL or RPG II
- 30+ users
- 360/370 or mini-computers
- On line, Real-Time or Batch Processing

Occidental Computer Systems
10202 Riverside Drive
No. Hollywood, Calif. 91602
(213) 763-5144

RPG TO COBOL

Dataware's software translator converts RPG and RPG II programs to the industry standard ANS COBOL (DOS or OS). The translator achieves an extremely high percentage of automatic conversion (approaching 100%) of the source code

- RPG/RPG II to PL/1
- PL/1 to COBOL
- EASYCODER/TRAN to COBOL
- BAL/ALC to COBOL
- AUTOCODER (7070) to COBOL
- COBOL to COBOL
- AUTOCODER/SPS to COBOL

For more information on our translators write or call today

Dataware, Inc.
495 Delaware Street
Tonawanda, N.Y. 14150
(716) 695-1412

RPG II SYSTEMS

- *A/R OPEN ITEM OR B/F
- *ACCOUNTS PAYABLE
- *GENERAL LEDGER
- *PAYROLL AND LABOR DIST.
- *INVENTORY
- *CREDIT UNION' MAILING, ETC

Extensive Documentation Provided

Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, LA. 71291
(318) 388-2236

GENERAL LEDGER SYSTEM?

What was the only one on the 1977 Datapro Honor Roll?

The answer is: The UCC General Ledger/Financial Control System. It can solve the Accounting Department's financial information problems...without creating new ones for EDP. Call 1(800) 527-3250 toll-free (in Texas, call 214/688-7313) for more information.

UCC
UNIVERSITY COMPUTING COMPANY
P. O. Box 47911 • Dallas, Texas 75247

1977 datapro HONOR ROLL

Blue Chip Software

Lots of blue chip companies use our software systems for one simple reason: blue chip performance.

May we tell you more?

McCORMACK & DODGE CORPORATION
381 Elliot Street Newton Upper Falls MA 02164 (617) 964-6610

Please send me more information on the system(s) I have checked.

___ General Ledger ___ Purchasing
___ Fixed Assets Analysis ___ Construction in Progress
___ Accounts Payable

Name ______
Title ______
Company ______
Computer ______
Address ______
City ______ State ______ Zip ______
Tel No ______

A SIMPLE SOLUTION TO A COMPLEX CONVERSION

DASD TRANSLATORS

+ THE RIGHT SUPPORT

A SOLID SOLUTION TO A COSTLY SITUATION

DASD TRANSLATORS SAVE TIME AND MONEY

We invite test evaluations of all of our language translators

RPG/RPG II to COBOL (DOS or OS)
DOS COBOL to OS COBOL
SYSTEM/3 COBOL to OS COBOL
GE MAP to OS COBOL
360/20 BAL to 360/370 OS ALC

DASD CORPORATION can provide the support your company needs to complete a successful conversion

Get a proven solution to your conversion problem. Many service options are available: translator lease, conversion only, conversion and clean compile, full conversion responsibility including testing and JCL. Call or Write Today

DASD CORPORATION
National Marketing
1480 Renaissance Drive, Suite 315
Park Ridge, Illinois 60068
312/299-5005

TONE 3
TSO for VS1
Redesigned to eliminate TCAM and the staggering overhead of user swapping
ISP
System to System Communication for VS1.
Intersystem Spool Processor

Two unique products from TONE Software Corp.

(write or phone for details)

TONE
SoftwareCorp.
(714) 636-8501
11588 Trask Avenue
Garden Grove, Ca 92643

ACCOUNTING SOFTWARE FOR DEC RSTS/E OR CTS-500 USERS

From one of the pioneers in commercial data processing using RSTS. Completely on-line, interactive systems available for **ACCOUNTS-PAYABLE, GENERAL-LEDGER, FINANCIAL-REPORTING, ACCOUNTS-RECEIVABLE and PAYROLL applications.**

These are consolidating packages and support multi-division company and multi-company corporate accounting functions.

If you are installing or have installed a Digital Equipment Corporation RSTS/E or CTS-500 system, contact us for cost-effective solutions to your core accounting problems

Plycom services, Inc.

(219) 935-5121
P.O. Box 160
Plymouth, IN 46563

ORDER ENTRY SOFTWARE

- On Line Terminals
- Sales Analysis By Product Reports/Committed Inventory
- Honeywell 62/60
- Cobol Accounts Receivable
- RPG Batch Mode
- Variable Dun Cycles

Call Bill Topoli

REVERE
30875 Carter St
Solon, Ohio 44139
(216) 248-0606

TIME

SERIES/1 PROGRAMMING

- BI-SYNC/ASYNCH/SDLC COMMUNICATIONS
- OEM DEVICE HANDLERS
- RPS SUPPORT
- COMPUTER INTERFACING
- ONLINE G/L AVAILABLE NOW
- COMPLETE BUSINESS SYSTEM UNDER DEVELOPMENT

APPLIED COMPUTER SERVICES, INC.
12200 Sylvan St.
North Hollywood, Calif. 91606
(213) 980-1193

CHICAGO
370 - 145
DOS/VS - GRASP
TIME/SERVICE

Computyme of Chicago
(Loop)
(312) 922-6624

CORE MEMORY REPAIR

Ampex, Burroughs, CAI, CMI, Data Craft, Data General, CDC, DEC, EMM, Fabri Tek, Honeywell, GAI, HP, Interdata, Lockheed, Plessey, NCR, SMI, Univac, Microdata, Varian, XDS.

Any Manufacturer's Memory

THREE DELTA CORP
1038 Kiel Ct.
Sunnyvale, CA 94086
(408) 734-2680

I.B.M. 360-40

All Shifts 128K, 4-2401 MOD-2, 9-2314, 1403-N1, 2540, 1401 Compatibility.

From $35/Hour

Restaurant Associates, Inc.
1540 Broadway
New York, N.Y. 10036
Contact:
Al Palmo (212) 997-1413
Charles Leigey (212) 997-1411

WE ARE

BROKERS OF COMPUTER TIME

New York & New Jersey [illegible]

Computer Reserves, Inc.
(212) 687-1840
(201) 676-1881

370/158 mod 3 Datacenter

3.5 meg MVS
Specializing in
Remote Job Entry
TSO, CICS, and Batch
IBM 3800 Laser Printer
Very Attractive Rates
Contact: Stu Kerievsky
(212) 564-3030

Datamor
132 West 31 St.
New York, N.Y. 10001

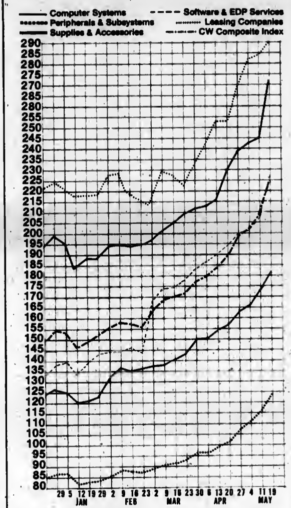
REMOTE JOB ENTRY

PHOENIX-HECHT

- IBM 370/158-3
- Nationwide incoming Watslines
- Complete systems and software support
- Full application Library (including all accounting applications)
- All high-level languages
- Prime time and off hours
- VS-2, HASP, INTERCOMM, ROSCOE
- Complete data security including off-site storage

For information
call John MacDougall
at (312) 861-7100

PHOENIX-HECHT
233 N. Michigan Avenue
Chicago, Illinois 60601



Earnings Reports

NATIONAL CSS
Year Ended Feb. 28

	1978	1977
Shr Ernd	$1.68	a$1.41
Revenue	46,683,000	41,703,000
Earnings	3,858,000	3,222,000
3 Mo Shr	.48	a.37
Revenue	13,619,000	10,663,000
Earnings	1,077,000	844,000

a-Adjusted for a stock dividend in November 1977

QUOTRON SYSTEMS
Three Months Ended March 31

	1978	1977
Shr Ernd	$.20	$.28
Revenue	8,113,740	7,383,625
Tax Cred		493,785
Earnings	1,074,930	961,024

RAPIDATA
Three Months Ended March 31

	1978	1977
Shr Ernd	$.18	$.09
Revenue	4,805,301	4,414,961
Earnings	316,666	187,199

SHARED MEDICAL SYSTEMS
Three Months Ended March 31

	1978	1977
Shr Ernd	$.33	a$.26
Revenue	14,070,302	10,313,831
Earnings	1,878,172	1,549,793

a-Adjusted for a two-for-one stock split paid in January 1978

COMSHARE
Three Months Ended March 31

	1978	a1977
Shr Ernd	$.63	$.43
Revenue	7,437,400	5,364,800
Earnings	1,118,100	701,500
6 Mo Shr	1.38	.89
Revenue	18,318,900	12,975,000
Earnings	2,442,300	1,489,800

a-Restated

PRIME COMPUTER
Three Months Ended April 2

	1978	1977
Shr Ernd	$.57	$.30
Revenue	18,117,000	8,313,000
Tax Cred		150,000
Earnings	1,609,000	732,000

Computerworld Sales Offices

Vice-President/Marketing
Roy Einreinhofer
Advertising Administrator
Terry Williams
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Ron Evans
Frank Collins
Account Managers
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
District Manager
Peter Senft
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Judy Milford
Account Managers
COMPUTERWORLD
1434 Westwood Boulevard
Los Angeles, Calif. 90024
Phone: (213) 475-8486

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelan
Account Coordinator
COMPUTERWORLD
353 Sacramento Street
Suite 600
San Francisco, Calif. 94111
Phone: (415) 421-7330

Japan
Mr. Shigema Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Japan
Phone: (03) 445-6101
Telex: J2424461

United Kingdom
Tony Vickers
IDG PUBLISHING LTD.
140-146 Camden Street
London NW1 9PF
England
Phone: (01) 267-1201
Telex: UK-264737

West Germany
Hans-Jurgen Ballnath
CW PUBLIKATIONENS
Friedrichstrasse 31
8000 Munich 40
West Germany
Phone: (089) 34-90-61
Telex: W Ger-5-215250-HKFD

TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 17, 1978

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	PRICE CLOSE MAY 17 1978	PRICE WEEK NET CHNGE	PRICE WEEK PCT CHNGE
A	AMDAHL CORP	22- 56	34 1/8	+5 3/4	+20.2
N	BURROUGHS CORP	35- 91	73 5/8	+5 5/8	+8.2
O	COMPUTER AUTOMATION	18- 35	34 1/2	+3	+9.5
N	CONTROL DATA CORP	20- 33	32 1/2	+1 1/2	+4.8
O	CRAY RESEARCH INC	15- 46	45 3/4	+1 1/4	+2.8
N	DATA GENERAL CORP	35- 59	58 1/2	+5 1/4	+9.8
N	DATAPOINT CORP	18- 56	53 3/4	+4 5/8	+8.8
N	DIGITAL EQUIPMENT	37- 53	49 1/4	+2 1/4	+4.7
N	ELECTRONIC ASSOC.	2- 8	7 3/4	+2 1/2	+47.4
A	ELECTRONIC ENGINEER.	8- 17	14 5/8	+ 1/8	+0.7
O	FOUR-PHASE SYSTEMS	13- 32	31 3/4	+3 1/4	+11.4
N	FORBORO	28- 54	36 1/8	+3 1/8	+9.4
O	GENERAL AUTOMATION	6- 10	9 3/4	0	0.0
O	GRI COMPUTER CORP	1- 1	1 1/8	0	0.0
N	HEWLETT-PACKARD CO	42- 87	81 3/8	+7 3/8	+9.9
N	HONEYWELL INC	43- 58	58 1/8	+6 1/8	+11.7
N	IBM	236-284	246	+6 1/4	+2.4
O	MANAGEMENT ASSIST	5- 18	18	+2	+12.5
O	MICRODATA CORP	7- 18	14 1/4	+1 1/4	+9.4
O	MINI-COMPUTER SYST	5- 12	8	+1	+14.2
C	MODULAR COMPUTER SYS	9- 15	14 1/2	+2	+16.0
N	NCR	52- 57	54 1/2	+5	+9.7
O	PRIME COMPUTER INC	12- 39	39 1/8	+3 3/8	+9.4
N	PERKIN-ELMER	17- 25	25 1/8	+2 1/4	+10.7
N	RAYTHEON CO	16- 47	45 5/8	+3 1/4	+7.4
N	SPERRY RAND	30- 44	43 7/8	+4 1/8	+10.5
O	SYCOR INC	8- 24	23 7/8	+1 3/4	+7.9
A	SYSTEMS ENG. LABS	5- 19	18 5/8	+2 7/8	+18.2
A	WANG LABS.	10- 23	23	+4 5/8	+25.1

LEASING COMPANIES

EXCH		PRICE 1977-78 RANGE (1)	PRICE CLOSE MAY 17 1978	PRICE WEEK NET CHNGE	PRICE WEEK PCT CHNGE
O	ALANTHUS CORP	5- 4	5 7/8	0	0.0
C	BOOTHE COURIER CORP	8- 16	18 1/4	+1 5/8	+9.7
O	CONDISCO INC	9- 17	15 1/4	+ 3/4	+5.1
A	COMMERCE GROUP CORP	1- 3	7/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	7/8	0	0.0
N	DATRONIC RENTAL	0- 2	1 5/8	- 1/4	-15.3
A	DCL INC	1- 4	4	- 1/8	-3.0
N	DPF INC	4- 12	11 5/8	+ 1/4	+2.1
N	ITEL	13- 27	26 3/4	+2 3/8	+9.7
N	LEASCO CORP	19- 34	32 5/8	+ 1/8	+0.3
O	LEASPAC CORP	1- 2	1 7/8	+ 1/4	+15.5
A	PIONEER TEX CORP	5- 11	5 3/4	- 1/8	-2.1
N	U.S. LEASING	10- 16	15 1/4	+ 3/8	+2.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1977-78 RANGE (1)	PRICE CLOSE MAY 17 1978	PRICE WEEK NET CHNGE	PRICE WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	1 1/8	+ 1/8	+12.5
O	AMACOMP INC	7- 14	13 7/8	+2 5/8	+23.3
A	APPLIED DATA RES.	5- 14	13 1/2	+2	+17.3
N	AUTOMATIC DATA PROC	23- 31	31 1/4	+1	+3.3
O	COLEMAN AMERICAN COS	1- 2	1 1/2	0	0.0
O	COMPU-SERV NETWORK	7- 15	11	+2 1/4	+25.7
O	COMP ELECTION SYSTMS	6- 10	9	0	0.0
C	COMPUTER HORIZONS	1- 2	2 1/4	0	0.0
C	COMPUTER NETWORK	6- 11	10	+ 5/8	+6.6
N	COMPUTER SCIENCES	7- 12	11 3/4	+ 5/8	+5.4
O	COMPUTER TASK GROUP	1- 2	3 1/4	+ 1/2	+18.1
O	COMPUTER USAGE	1- 4	3 1/2	+ 1/8	+5.7
O	COMSHARE	5- 15	15	+3	+25.0
O	DATA DIMENSIONS INC	3- 5	4 5/8	+1 1/8	+32.1
O	DATATAB	1- 2	1 1/4	0	0.0
N	ELECTRONIC DATA SYS.	14- 25	21 1/2	+2 5/8	+15.9
O	INSYTE CORP	2- 3	1 1/8	- 1/8	-10.0
C	IPS COMPUTER MARKET.	1- 2	2 1/4	0	0.0
O	KEANE ASSOCIATES	3- 4	3 5/8	0	0.0
O	KEYDATA CORP	1- 3	2 1/4	+ 3/8	+20.0
A	LOGICON	7- 17	14 1/4	0	0.0
A	MANAGEMENT DATA	1- 2	1 1/8	0	0.0
A	NATIONAL CSS INC	10- 25	25 1/4	+4	+18.8
O	NATIONAL DATA CORP	4- 12	12	+1 1/4	+11.4
A	ON LINE SYSTEMS INC	16- 25	24 1/2	+1	+4.2
N	PLANNING RESEARCH	3- 7	7	+ 1/8	+1.8
O	PROGRAMMING & SYS	1- 1	1	+ 1/4	+53.3
O	RAPIDATA INC	2- 5	4 3/4	+ 5/8	+8.5
O	REYNOLDS & REYNOLDS	17- 26	24	+3 1/4	+14.2
O	SCIENTIFIC COMPUTERS	1- 4	5 5/8	+ 1/8	+2.2
O	TYMSHARE INC	14- 27	26 7/8	+3 7/8	+16.8
A	URS SYSTEMS	4- 7	6 3/8	+ 3/8	+6.2
N	WYLY CORP	1- 5	5 1/4	+ 1/4	+5.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	PRICE CLOSE MAY 17 1978	PRICE WEEK NET CHNGE	PRICE WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 24	25 7/8	+2 3/8	+12.3
C	ADVANCED MEMORY SYS	7- 14	14 3/8	+2	+14.1
N	AMPEX CORP	8- 16	15 1/4	+ 3/4	+5.1
O	ANDERSON JACOBSON	5- 8	7 1/4	0	0.0
N	APPLIED DIG DATA SYS	10- 20	14 1/8	+1 3/4	+12.1
O	BEEHIVE INT'L	5- 12	5 7/8	- 3/8	-6.0
A	BOLT, BERANEK & NEW	6- 10	9 3/8	+1 1/2	+19.0
N	BUNKER-RAMO	8- 17	16 3/4	- 1/8	-0.7
A	CALCOMP	3- 8	8 3/8	+1	+13.5
O	CAMBRIDGE MEMORIES	1- 6	6 1/8	+1 1/8	+22.5
N	CENTRONICS DATA COMP	14- 30	25 3/8	+4 1/8	+19.4
C	COGNITRONICS	1- 1	1 1/4	+ 3/8	+53.7
O	COMPUTER COMMUN.	5- 9	9 5/8	+ 7/8	+10.0
O	COMPUTER CONSOLES	4- 7	6 1/2	+ 1/4	+4.0
A	COMPUTER EQUIPMENT	2- 6	5	0	0.0
O	COMPUTER TRANSCEIVER	1- 1	1 3/8	0	0.0
C	COMTEN	9- 22	20	+ 1/8	+0.4
N	CONRAC CORP	19- 28	25	+1 1/2	+6.3
O	DATA ACCESS SYSTEMS	4- 3	4 1/2	0	0.0
O	DATA 100	6- 17	16 3/4	0	0.0
A	DATA PRODUCTS CORP	9- 20	19	- 1/8	-0.4
O	DATA TECHNOLOGY	3- 4	4 1/4	0	0.0
O	DATUM INC	1- 4	4	+ 1/8	+3.2
O	DECISION DATA COMPUT	2- 3	2 3/4	+ 5/8	+29.4
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
A	DOCUMATION INC	6- 19	18 7/8	+1	+5.5
O	DATARAM CORP	2- 24	24	+4 1/2	+23.0
N	ELECTRONIC M & M	4- 7	7 1/4	+1 5/8	+28.8
O	FABRI-TEK	1- 2	1 1/4	-	-4.5
O	GENERAL COMPUTER SYS	0- 2	1	0	0.0
N	HAZELTINE CORP	8- 15	15	+1	+7.1
N	HARRIS CORP	28- 58	58 5/8	+5 5/8	+10.1
O	INFOREX INC	4- 9	9 1/4	+ 7/8	+10.4
O	INFORMATION INTL INC	8- 14	9 3/4	0	0.0
O	INTEL CORP	38- 59	58	+5	+9.4
A	LUNDY ELECTRONICS	3- 6	5 1/4	- 3/4	-18.7
O	MSI DATA CORP	4- 19	18 5/8	+1 3/8	+7.9
N	MEMOREX	23- 47	47 1/4	+5 3/4	+8.6
N	MOHAWK DATA SCI	5- 12	12 1/4	+2 3/8	+24.0
O	PENRIL CORP	2- 9	8 3/4	+ 1/4	+2.9
N	PERTEC CORP	7- 14	13 5/8	- 1/4	-1.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	3- 5	5 5/8	0	0.0
O	RECOGNITION EQUIP	6- 10	9	+ 5/8	+4.5
O	SCAN DATA	1- 4	3 3/8	- 1/8	-3.5
O	STORAGE TECHNOLOGY	10- 39	39	+ 3/4	+1.9
O	T BAR INC	7- 19	15 3/4	-1 1/2	-8.6
O	TALLY CORP.	4- 9	8 3/4	- 1/4	-2.7
A	TEC INC	6- 10	7 7/8	0	0.0
N	TEKTRONIX INC	29- 44	44	+3 3/8	+8.3
N	TELEX	2- 4	4	+1 1/8	+25.0
O	TESDATA SYSTEMS CP	13- 20	19	+ 1/2	+2.7
O	WELTER INC	1- 1	5/8	+ 1/8	+25.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977-78 RANGE (1)	PRICE CLOSE MAY 17 1978	PRICE WEEK NET CHNGE	PRICE WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 9	9 1/4	+ 7/8	+10.4
O	BALTIMORE BUS FORMS	1- 4	3 1/2	0	0.0
A	BARRY WRIGHT	10- 25	24 3/4	+2 5/8	+11.8
O	CYBERMATICS INC	1- 1	1	0	0.0
O	DUPLEX PRODUCTS INC	14- 25	25	+1 5/8	+6.9
N	ENNIS BUS. FORMS	6- 15	14 3/4	+ 3/8	+2.6
N	3M COMPANY	43- 56	55 5/8	+3 7/8	+7.5
C	MOORE CORP LTD	24- 37	32 1/4	+3 3/4	+15.1
N	NASHUA CORP	16- 31	30 7/8	+2 1/4	+7.8
O	STANDARD REGISTER	18- 26	24 3/4	- 1/2	-1.9
O	TAB PRODUCTS CO	8- 19	10 5/8	- 3/4	-6.5
N	UARCO	18- 27	26 7/8	- 1/8	-0.4
A	WABASH MAGNETICS	10- 15	13 1/2	+ 5/8	+4.8
N	WALLACE BUS FORMS	17- 24	25 3/8	+ 1/8	+0.5

InSci/80.

The first minicomputer service dedicated to people.

InSci/80 puts human resource computing where it belongs - right in the personnel department. With personnel records and reporting including employee history, EEO, ERISA, and OSHA activity. Immediate online access to pertinent information in time to help people. Plus absolute security and confidentiality based on anticipated privacy legislation.

Marketed as a service, InSci/80 is on call 24 hours a day as a standalone system or part of a distributed processing network. InSci provides the full package - hardware, software, training, maintenance, installation and data conversion assistance.

Already installed and operating in a major corporation, InSci/80 is a service of Information Science, the leading developer and supplier of personnel systems and services. Only InSci has worked with more than 400 major organizations, has 50 of the Fortune 100 companies as clients and has Human Resource activities as its only business.

Isn't it time
your people got
the priority they deserve?

**InSci/80
can cut
your annual cost of
personnel computing
at least $30
per employee.**

InSci
Information Science Incorporated

95 Chestnut Ridge Road, Montvale, New Jersey 07645 201-391-1600 or toll-free 800-631-1650